Annual AVMA Meeting

Denver, Colorado

August 14-18, 1960

# Journal

OF THE

## AMERICAN VETERINARY MEDICAL ASSOCIATION




Vol. 136 April 1, 1960 No. 7

*Introducing*


*for rapid*
*anesthesia*
*and prompt recovery*

BREVANE is truly a short-acting barbiturate — combining high anesthetic activity with low toxicity. Induction is smooth, rapid, and free of excitement or irritability. Dosage is low, requiring only 25 mg. (1 cc. of a 2.5 per cent solution) per five pounds of body weight.

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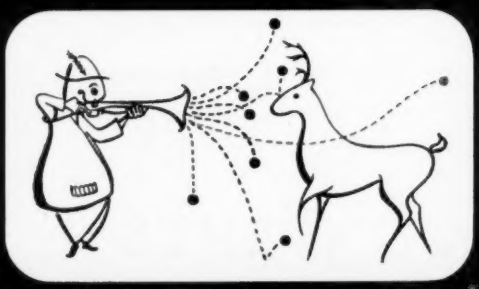
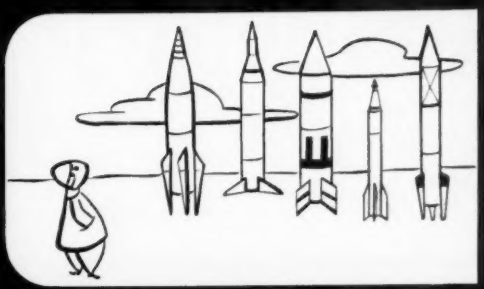
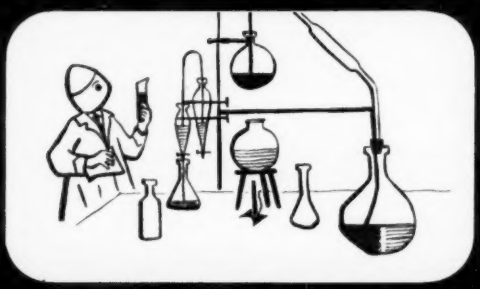


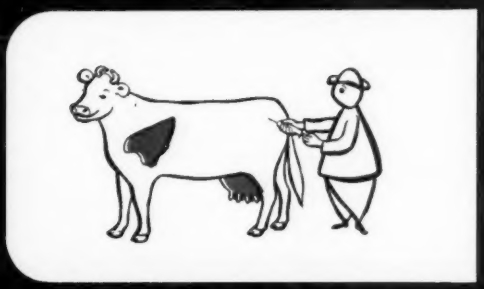
1. The Blunderbuss was fairly effective at short range



2. Today guided missiles seek out distant targets

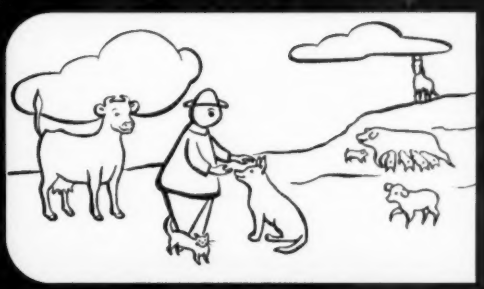


3. Antibiotics have also come a long way since penicillin



4. Iomycin "seeks out" respiratory and/or mammary tissues


5. Long-lasting therapeutic levels



6. For all species

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LINCOLN, NEBRASKA U.S. Patent No. 2,694,063

Journal

OF THE
AMERICAN VETERINARY
MEDICAL ASSOCIATION

Vol. 136 No. 7 April 1, 1960

# CONTENTS

## ARTICLES



## EDITORIAL



## FEATURES



**Contents continued on adv. page 4**



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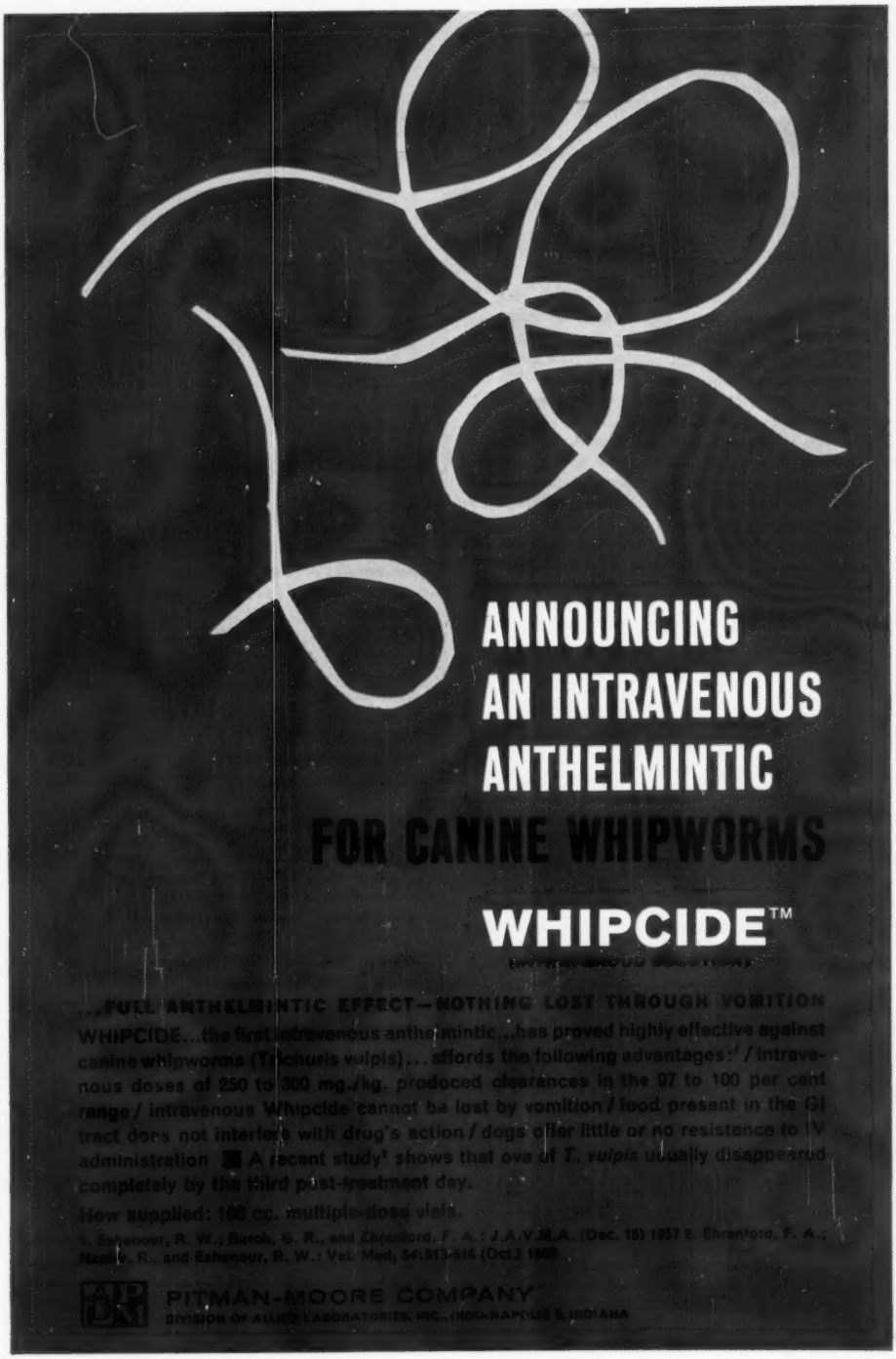
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WHIPCIDE...the first intravenous anthelmintic...has proved highly effective against canine whipworms (Trichuris vulpis)... affords the following advantages:[1] / intravenous doses of 250 to 300 mg./kg. produced clearances in the 97 to 100 per cent range / intravenous Whipcide cannot be lost by vomition / food present in the GI tract does not interfere with drug's action / dogs offer little or no resistance to IV administration ■ A recent study[2] shows that ova of T. vulpis usually disappeared completely by the third post-treatment day.
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1. Eshenour, R. W.; Burch, G. R., and Ehrenford, F. A.: J.A.V.M.A. (Dec. 15) 1957 2. Ehrenford, F. A.; Nesbitt, R., and Eshenour, R. W.: Vet. Med, 54:513-516 (Oct.) 1959
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# Correspondence

February 3, 1960

Dear Sir:

In appreciation of the fine article on open teat surgery by Dr. Steere and his associates, I would like to comment on the questions raised in regard to the German method of suturing (Gotze *et. al.*). I have used this method often, employing medium strong Vetafil suture. The suture should be tight enough to prevent leakage, but great care should be taken to prevent excessive tension. A plastic spray is applied, and only a light gauze bandage is used. This is merely taped to the base of the teat and removed within 36 to 48 hours. The cow can be milked by hand within 12 hours after surgery. For aftercare, the principles outlined in the article are applied. I regard the use of a teat cannula as a dangerous nuisance and never use one. Heavy bandaging too often enhances carelessness on the part of the milker and promotes rather than inhibits infection of the wound.

The method is simple and efficient and can be performed on the standing cow. If healing occurs by first intention (it should if proper care is taken before and after suturing), an intelligent owner will often be able to remove the suture himself simply by pulling at a string attached to the turn of the suture after he has cut off its one and only knot.

s/H. J. NEUMANN, D.V.M.
*Burke, S. Dak.*

✦ ✦ ✦

February 10, 1960

Dear Sir:

We are happy to report that House Bill 118 will be held in committee and that veterinary licenses will not be issued promiscuously in Kentucky without education or examination.

This has been one of our most dangerous legislative problems in some time. The members of the Kentucky Veterinary Medical Association are to be commended for the manner in which they rose to face the problem.

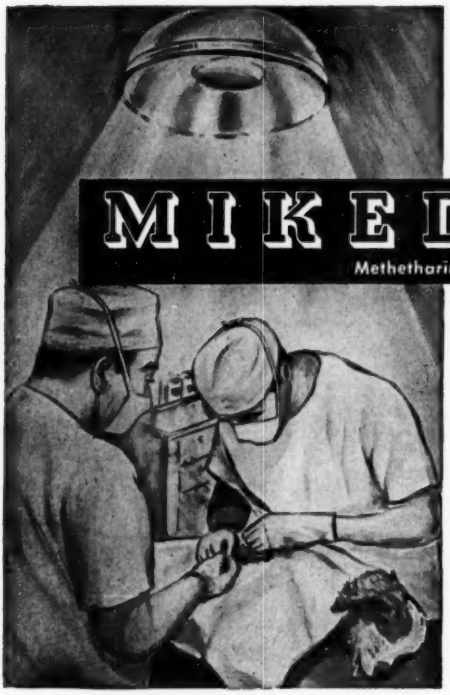
We particularly wish to thank Dr. James R. Hay, the AVMA director of professional relations, for his assistance in this problem. The *J.A.V.M.A.* editorial, "When the Bombs Fall," furnished some of our most dramatic testimony and was certainly a big help in our case.

s/Harley H. Sutton, D.V.M.
Committee on Legislation
Georgetown, Ky.

[Editor's Note: Kentucky House Bill 118 (Senate Bill 80) proposed to "amend K.R.S. 321.210 to permit issuance of a license to practitioners of veterinary medicine, in practice 15 years and since 5 years prior to 1948, and with a high school education, upon submission of a verified statement of such fact, without further examination; and renewable annually; and provides for an issuance fee of $25.00."

The editorial, "When the Bombs Fall," appeared in the Feb. 1, 1960, JOURNAL of the AVMA and described how veterinarians would be utilized to supplement physicians in disasters involving mass human casualties.]

## CONTENTS—Continued



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# news from Washington . . .

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J. A. McCallam, VMD
Brig. Gen. USA (Ret.)

## LEGISLATIVE

**Committee Favors Increased Milk Program Funds**

Senate committee on agriculture favorably reported on bill *H.R. 9331*, increasing authorized maximum expenditure under the special milk program for children — for fiscal year beginning July 1, 1960, not to exceed $85 million, and each fiscal year thereafter not to exceed $95 million of Commodity Credit Corporation funds (see JOURNAL March 1, 1960 adv. p. 8).

**National Cattlemen Adopt Resolutions**

Among the 42 resolutions adopted by the National Cattlemen's Association 63rd annual convention in January and printed in the *Congressional Record* at the request of Sen. Goldwater (R., Ariz.); (1) adequate funds for federal meat inspection, (2) items relative to brucellosis, including adequate funds, (3) a screwworm eradication program in the Southwest and (4) intensified research concerning leptospirosis.

## NEW BILLS

**Brucellosis Eradication Program**

*House Joint Resolution 619*, Rep. McSween (D., La.) points out reduced level of state and federal support for brucellosis eradication program has curtailed progress being achieved under 1959 level of appropriated funds, and that under current level of support complete nationwide certification status cannot occur before 1974. Such a delay will cost about $230 thousand more than if work could have continued under 1959 level of $20 million, says McSween. His resolution would authorize $20 million for fiscal year June 30, 1960 and $22 million each for fiscals 1961 through 1965. Hearings on bill by house agriculture dairy subcommittee started March 7.

**Poultry Products Inspection Act**

*S. 3089* — Sen. Ellender (D., La.) would amend Poultry Products Inspection Act by deleting from subsection (15 (a) (3) the proviso pertaining to the exemption due to expire July 1, 1960. In effect, the amendment would continue the exemption for any person engaged in processing of poultry or poultry products for commerce on determination by the Secretary of Agriculture that it would be impractical to provide inspection and that the exemption will aid in the effective administration of the Act.

**Agricultural Services in Guam**

*S. 3060* — Sen. Murray (D., Mont.), to establish federal agricultural services in Guam. Would include such programs administered by USDA as the secretary determines will promote the welfare of that island.

(*continued on adv. p.* 8)


# Hang together... or, we hang separately!

Cooperation is a situation where people work together. Curiously enough, it can't be bought, sold or created by force. But fear of consequences can and often does bring people closer together—especially for the solution of a common problem.

The growing use of veterinary biologics by untrained laymen presents a serious problem to both the veterinarian and the ethical house that sells only to the profession. If such practices continue to flourish and grow, could it not be detrimental to the veterinarian, the ethical supply house and to the entire livestock industry?

Fortunately, there is a logical way you can help. It is simply this: Every time you place an order, ask yourself these questions: "Will this order encourage the use of veterinary supplies by laymen? Does the company that fills it sell only to graduate veterinarians?"

Think about that for a bit . . . then go ahead and order. We have confidence in your good judgment. That's why we have cast our lot with the graduate veterinarian. We're sure you realize our common destiny.

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***Produced for and sold to Graduate Veterinarians only***

**Federal Employee Salary Increases**

*H.R. 10046* — Rep. Dent (D., Pa.), to adjust rates of basic compensation of certain officers and employees of federal government. Would provide increases for postal employees and those employees under the Classification Act of 1949 as amended, grades 1 through 18.

**Importation of Animals**

*H.R. 10558* — Rep. Wharton (R., N.Y.), amend Tariff Act of 1930 to provide for free importation of wild animals, birds, and reptiles intended for exhibition in the U.S., whether intended for use by the importer or for sale for exhibition purposes. *H.R. 10598* — Rep. Huddleston (D., Ala), to clarify certain provisions of the Criminal Code relative to the importation or shipment of injurious mammals, birds, amphibians, fish, and reptiles; and relating to the transportation or receipt of wild animals or birds taken in violation of state, national or foreign laws.

**Tax Credit for Certain Employers**

*H.R. 10514* — Rep. Dorn (R., N.Y.), amend Internal Revenue Code of 1954 to provide credit against income tax for an employer who employs older persons in his trade or business.

**Fair Competition Acts**

*H.R. 10499* — Rep. Johnson (D., Md.), amend the Federal Trade Commission Act to strengthen independent competitive enterprise by providing for fair competitive acts, practices and methods of competition.

**Water Pollution Control Act**

*H.R. 10444* — Rep. Johnson (D., Wis.), amend the Federal Water Pollution Control Act to expand research, extend state and interstate water pollution control program grants, and strengthen enforcement procedures.

## MISCELLANEOUS

**Animals Fed Hormones Not Passed For Slaughter**

USDA Meat Inspection Division Memorandum No. 278, dated Feb. 8, 1960, states, "When at the time of antemortem inspection the inspector has reason to believe that a period of time less than 48 hours has elapsed since an animal has been withdrawn from feed containing diethylstilbestrol, such animal shall not be passed for slaughter until the termination of such 48-hour period."

**Meat Inspection Talk Available**

Dr. A. R. Miller, director, meat inspection division, ARS, gave a talk at the New York State Bar Association meeting Jan. 27, 1960, entitled "Food Additives and Federal Meat Inspection." A copy may be obtained by writing to the Meat Inspection Division, ARS, USDA, Washington 25, D.C.

**"Shipping Fever" Grant Awarded**

National Institute of Health has given a grant to the Department of Veterinary Science, University of Maryland for the study of "shipping fever."

# POLY-JECT*

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*The polysaccharide complexed injectable iron for intramuscular use . . . A solution for the treatment and prevention of*

***IRON DEFICIENCY ANEMIA***

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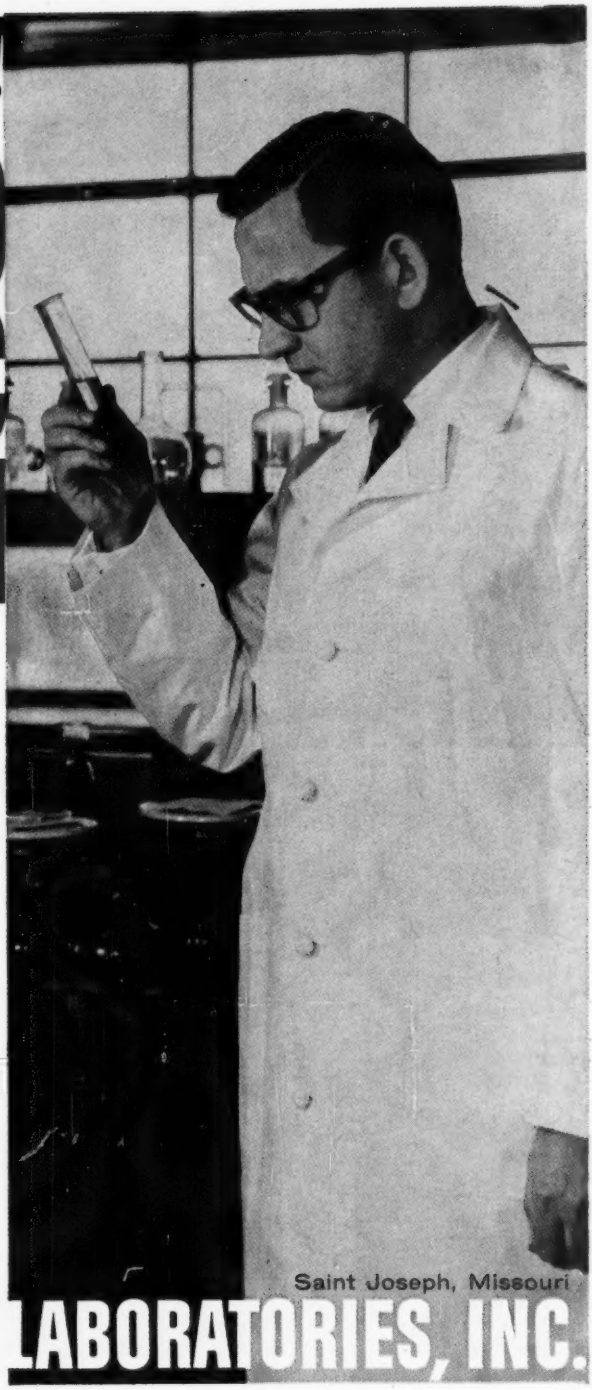

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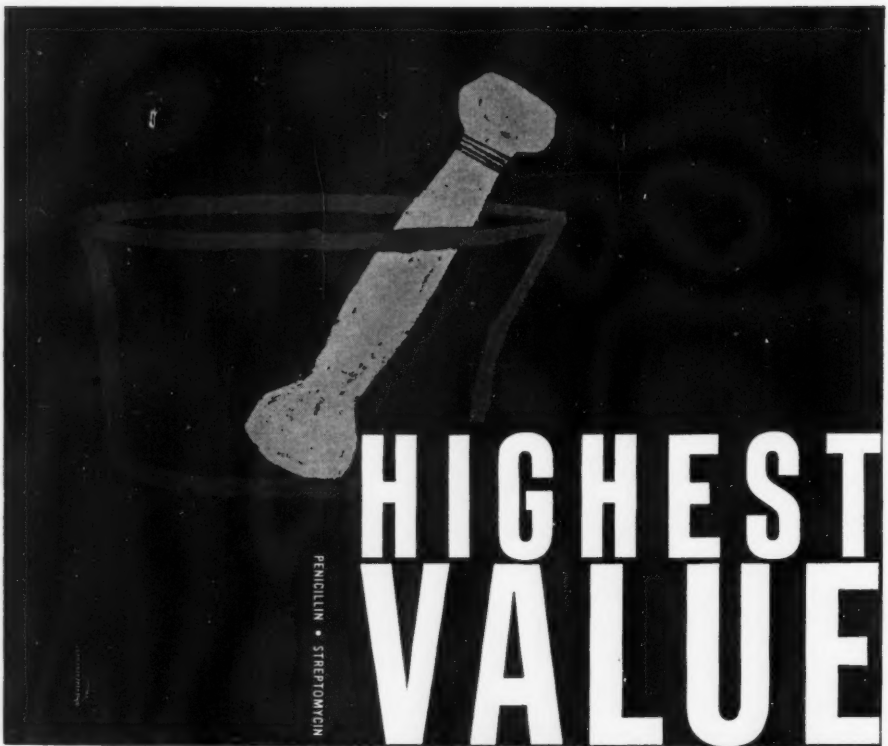

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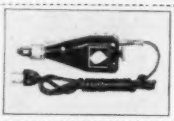

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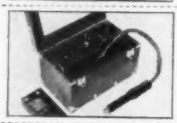

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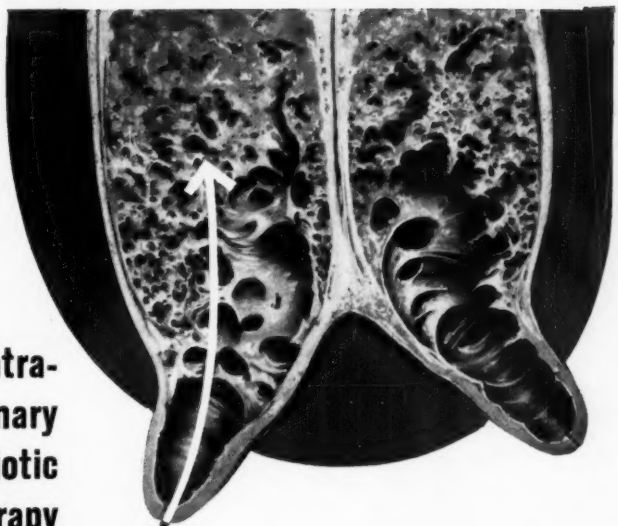

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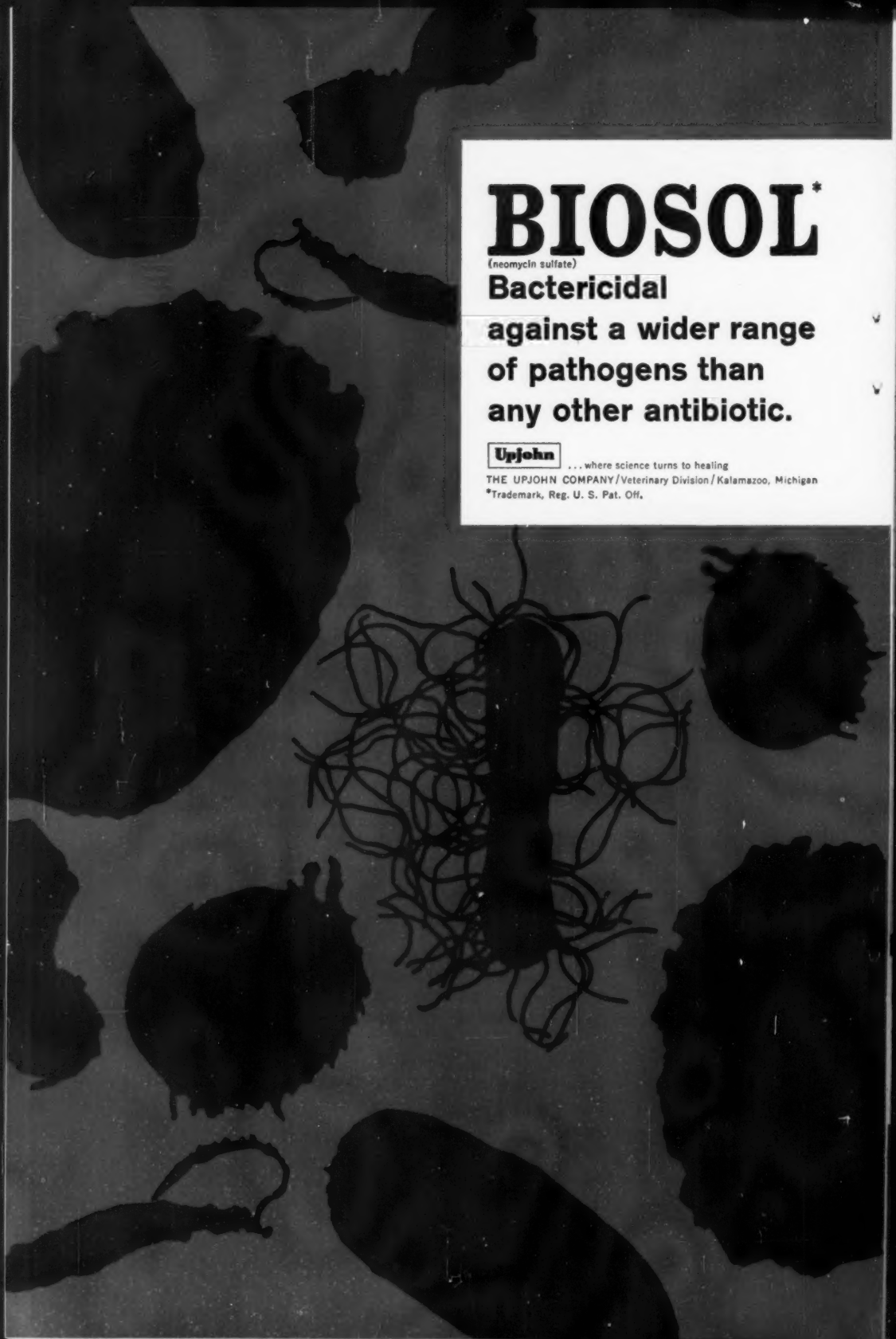

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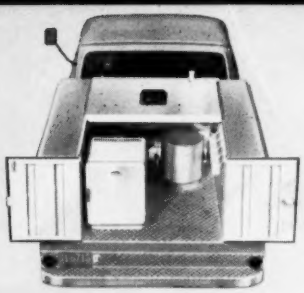

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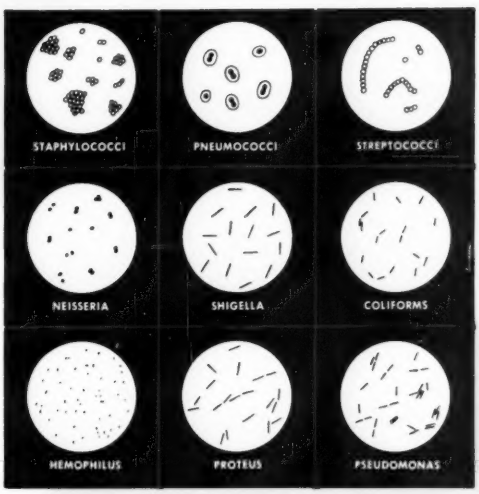
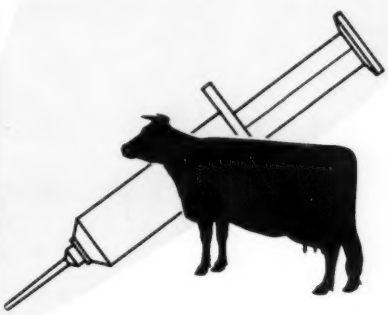





| COMPARISON OF ACTIVITY OF SPECTRUM | GRAM POSITIVE BACTERIA | | | GRAM NEGATIVE BACTERIA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 STAPHYLOCOCCI | 2 PNEUMOCOCCI | 3 STREPTOCOCCI | 4 NEISSERIA | 5 SHIGELLA | 6 COLIFORMS | 7 HEMOPHILUS | 8 PROTEUS | 9 PSEUDOMONAS |
| Triple Sulfas | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Penicillin | ■ | ■ | ■ | ■ | | | | | |
| Streptomycin | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| Neomycin | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ |
| Brand A BROAD SPECTRUM ANTIBIOTIC | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Brand B BROAD SPECTRUM ANTIBIOTIC | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Brand C BROAD SPECTRUM ANTIBIOTIC | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| **NEOTHION** | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |



–The chart above lists 9 organisms known to cause mastitis. Solid red squares indicate effective mastitis control. *Note that only Neothion is effective against all nine.*

Light red squares indicate the widely demonstrated fact that staphylococci have built up a resistance to most antibiotics and sulfas now in use. Staphylococci are among the chief causative agents of mastitis. *Note that only Neothion controls resistant strains of staphylococci.*

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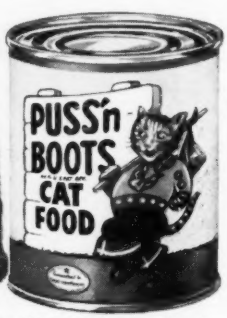


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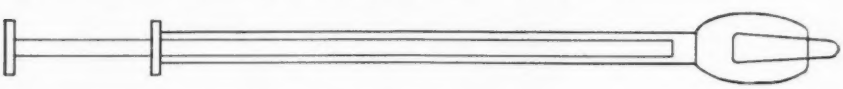

The cow may then be bred during the next estrus.

Supply: FURACIN Solution Veterinary SQUEEJET (30 cc. each), boxes of 12; FURACIN Suppositories Veterinary, boxes of 12.

1.Vigue, R. F., et al.: J. Am. Vet. M. Ass. 134:308 (April 1) 1959.
2.Vigue, R. F.: Personal communication.

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**Fourth Regional Conference on the Nitrofurans in Veterinary Medicine—April 1, 1960, Fairmont Hotel, San Francisco, California.**

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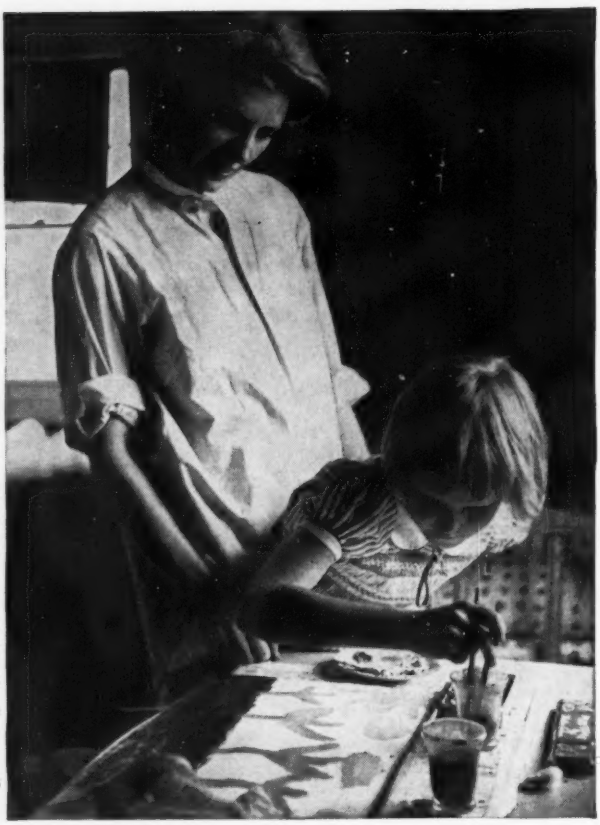

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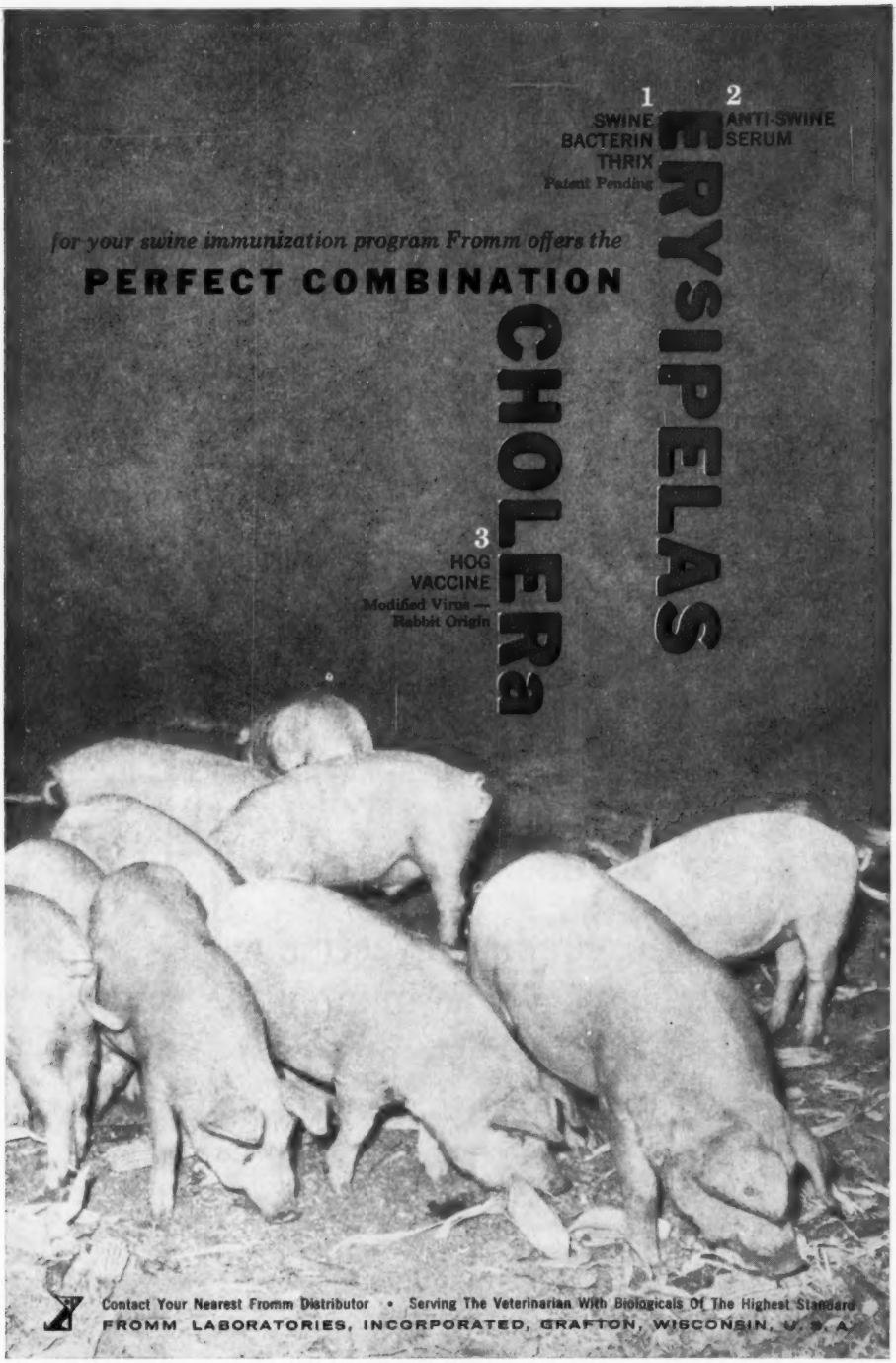
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Vol. 136
No. 7
April 1, 1960

Journal
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AMERICAN VETERINARY
MEDICAL ASSOCIATION

# *The Problem of* Adulterated Milk and *How It Affects* the Veterinarian

Congress recently amended the Federal Food, Drug and Cosmetic Act by passing the Food Additives Amendment of 1958.

Although the practicing veterinarian had definite responsibility under the Act prior to the enactment of the Food Additives Amendment, there has been a marked increase in FDA enforcement activities since its enactment. This development has focused increased attention on the possibility of the veterinarian's involvement in violations of the Act. The following is quoted from Chapter III, Section 301, of the Act:

> The following acts and the causing thereof are hereby prohibited:
>
> (a) The introduction or delivery for introduction into interstate commerce of any food, drug, device, or cosmetic that is adulterated or misbranded.

Whereas few veterinarians are directly concerned with the interstate shipment of milk or milk products, it is quite probable that practitioners could be responsible for adulterating such products and therefore be responsible for *causing the introduction into interstate commerce of an adulterated food.*

Most practitioners know that the intramammary infusion of common mastitis preparations result in appearance of the drug in the milk for a period up to 72 hours. Because of this, milk from an animal so treated must not be used for food for at least 72 hours. Some practitioners, however, may not know that the administration of an antibacterial agent by any route may result in the appearance of the drug in milk. The FDA has learned that use of penicillin by intramuscular injection in dairy animals is one of the causes for the failure to eliminate penicillin from market milk.

**A special bulletin prepared for AVMA members by the Council on Biologic and Therapeutic Agents**

The FDA officials are currently involved in a vigorous campaign to eliminate the distribution and sale of adulterated milk. One factor responsible for this campaign is the increasing number of people who are sensitive to penicillin. Ingestion of milk or milk products by an exquisitely sensitive person is hazardous. Aiding this campaign is the fact that milk can now be assayed for the presence of an antibacterial agent in just two and one-half hours. This test is capable of detecting many antibacterial agents. In addition, it can be made specific for penicillin if penicillinase is used.

Samples of milk are currently being ob-

tained in various parts of the country. When testing shows that the milk is adulterated, the FDA intends to determine who is responsible for the adulteration.

Since the instigation of the campaign to get adulterated milk off the market, FDA personnel have encountered situations wherein the dairy farmer who introduced adulterated milk into interstate commerce had not recently treated any of his animals with the drug detected in his milk. In at least one instance, further inquiry revealed that a few days prior to the shipment of the adulterated milk, a veterinarian had given one of the cows in the herd an intramuscular injection of penicillin but had not advised that her milk be withheld. In this instance, the veterinarian had contributed to the introduction of an adulterated product into interstate commerce. Whether he violated a federal statute and was subject to the penalties prescribed by the law has not been tested in the courts; however, it is a problem deserving serious consideration.

All veterinarians should know that the use of a systemic antibiotic, sulfonamide, or comparable product may result in the appearance of the drug in the milk. There are penicillin products which may cause adulteration of the milk from a treated animal for a period of more than six days. (Federal law requires labeling of these products to show that milk from the animal treated should not be used for food for seven days after the last treatment.) It is the veterinarian's responsibility to inform the dairy farmer of this fact so that milk drawn from this cow will not be used for food for the prescribed number of days. A veterinarian should constantly be aware that the above facts apply not only when he is treating cows for mastitis but for any condition.

How can the veterinarian fulfill his obligation to the public and to his clients under the provisions of the FFD & C Act? He can do this by routinely informing his clients that the treatment of the animal may result in adulteration of the animal's milk for a certain number of days and that the milk, therefore, should not be used for food for that period of time. It is not necessary for the veterinarian to advise the client in writing. The practitioner who has the reputation of verbally offering such information to his clients is adequately protected. He is also contributing to the basic concept of the FFD & C Act—the protection of the health of the nation.

## Neo-Rickettsia Infection of Newborn Calves

Rickettsia infection in newborn calves often originates in the uterus. The calf is born infected or even ill as is evidenced from necropsy lesions.

The disease develops most frequently in the acute or subacute septicemic form. It affects young calves several days to several weeks old most often, but may affect calves up to weaning age. It usually terminates fatally within several hours to several days.

Smears from the viscera, lungs, liver, spleen, kidneys, and mesenteric ganglia of calves revealed organisms belonging to the neo-Rickettsia group. Confirmatory tests were performed on mice, guinea pigs, and rabbits. A rabbit inoculated with these organisms developed paralysis in 15 days and died after 51 days.—*Rev. med. vet., 22, (1959): 714.*

*A Reverse-Phase Disk Assay*

# Test for Antibiotics in Milk

F. V. KOSIKOWSKI, PH.D.
R. A. LEDFORD, M.S.

THE NEED for a simple field test for detecting penicillin and other antibiotics in milk needs no great elaboration. Its advantages are self-evident.

In 1957, a vacuum and gas principle to make standard laboratory antibiotic tests for mobile field work was reported.[3] In their present form, the A.P.H.A. standard laboratory disk method[1] and the Food and Drug Administration test[2] require seeding nutrient whey agar with test bacteria before milk being tested is applied to the agar surfaces by wet paper disks. Such whey agar plates must be stored at low temperature (35 to 40 F.) until the time of testing. Exposure to room temperature, even for a brief period before milk application, initiates growth of seeded bacteria and makes the test invalid.

Continued research on the promising vacuum and gas procedures now under study has led to a new concept in antibiotic testing of milk. This new test, designed to circumvent the restrictions imposed by rapid growth of bacteria on nutrient agar plates, yields results in 4 hours or less. This report describes the principle and details of this concept.

### Principle of Method

Disk assay methods for milk are dependent upon spores of *Bacillus subtilis* as the test organism. Bacterial spores possess an advantage over vegetative cells in that no prior transfer is required to maintain full activity of test organisms before seeding. Another characteristic of bacterial spores is their ability to survive almost intact in unfavorable environments. This fact, never taken advantage of in antibiotic tests for milk, is the basis for the new reverse-phase method. Elimination of all nutrients from the agar bed already seeded with spores of *B. subtilis* prevents germination of the spores at any temperature exposure. Reversing the nutrient phase and embodying the paper disk with sufficient food materials make it possible to start the bacterial growth at any time simply by applying the milk-moistened paper disk to the agar surface. Thus, mobility of the test at room temperature is possible.

### Materials Required

Plain saline agar was prepared by dissolving 30 Gm. of agar and 9 Gm. of sodium chloride (CP) with distilled water, *q.s.* 1 liter. This agar was sterilized at 248 F. for 15 minutes. A pH of 6.3 was considered most desirable; this was achieved without any adjustment.

*Bacillus subtilis* spore suspensions were obtained from Difco Co., Detroit, or were prepared in this laboratory.

Nutrient disks were prepared by wetting Schleicher and Schuell paper disks (No. 740-E) in a solution of 20 per cent peptone and 20 per cent dextrose and freeze-drying all the disks in one lot.

### Methods

To 100 ml. portions of hot (158 F.) sterile, plain saline agar were added 1 ml. of *B. subtilis* spores; 10-ml. portions of

Dr. Kosikowski is professor of dairy science, Cornell University, Ithaca, N.Y. Mr. Ledford is instructor in dairy science at the same institution.

This research was supported in part through Public Health Service Grant E-2078.

**TABLE 1 — The Effect of Disk Nutrient Concentration upon the Sensitivity of the Reverse-Phase Method***

| 1/4-in. test disk dried with | B. subtilis growth around disk (normal milk) | Diameter of inhibition zone (cm.) Fresh milk containing 0.1 I.U. penicillin/ml. milk | Fresh milk containing 0.5 I.U. penicillin/ml. milk |
|---|---|---|---|
| 2.5% peptone | ++ | 1.3 | – |
| 5.0% peptone | +++ | 1.3 | – |
| 10.0% peptone | ++++ | 1.2 | – |
| 20.0% peptone | +++++ | 1.1 | 1.8 |
| 20.0% peptone-20.0% dextrose | +++++ | 1.0 | 1.5 |

*Observations after 6 hours at 95 F. + = Growth visual to eye. Increase in + denotes greater density of growth. – = No growth in immediate area of disk and no zone or halo. These milk samples would be considered penicillin-positive.

this seeded agar were pipetted evenly over the bottom surfaces of standard-size glass or disposable plastic Petri plates. When the agar was solidified, plates were sealed in moisture-proof packets. These can be held several weeks at 40 F. without drying out.

For testing purposes, the plate was removed from the packet. A special nutrient-packed paper disk, moistened with the milk being tested, was applied to the surface of the agar. Disks were freed from excess milk by brief shaking and then spaced about 20 mm. apart on the agar surface.

After the desired quota of disks was applied to the Petri dish, the covered plate was incubated upright at 95 to 98.6 F.

Four to 6 hours later, the agar surfaces, with cover removed, were visually examined in light at various angles. A growth area next to a disk indicated normal milk, while a clear area of no growth around the disk, with or without a halo, usually indicated the presence of antibiotics.

**TABLE 2 — The Sensitivity of the Reverse-Phase Disk Assay Method**

| Concentration of penicillin in milk* (I.U./ml. milk) | Diameter of zone** in 6 hours at 95 F. Reverse-phase technique: 20% peptone disks | 20% peptone-20% dextrose disks | Standard whey agar disk assay method (plain disks) |
|---|---|---|---|
| 0.00 | 0.7 | 0.7 | 0.7 |
| 0.01 | 0.7 | 0.7 | 0.7 |
| 0.02 | 0.7 | 0.7 | 0.7 |
| 0.03 | 0.7 | 0.9 | 0.7 |
| 0.05 | 0.9 | 0.9 | 0.9 |
| 0.10 | 1.1 | 1.1 | 1.1 |
| 0.20 | 1.3 | 1.3 | 1.3 |
| 0.30 | 1.5 | 1.5 | 1.5 |
| 0.50 | 1.8 | 1.6 | 1.7 |
| 1.00 | 2.1 | 2.0 | 2.0 |

*Milk was heated to 180°F. 2 min. after penicillin was added.

**A value of 0.7 cm. represents the diameter of the disk itself and implies in this study that growth area next to disk was present.

## Results

*Sensitivity of Method.*—Compared with the A.P.H.A. standard method,[1] the reverse-phase disk assay test has equal sensitivity (table 1). Penicillin concentrations as low as 0.05 I.U. of penicillin per milliliter of milk were detected using ¼ inch disks. Sensitivity was higher with larger disks* and with certain specific nutrients on the paper disk. It is reasonable to expect, with further study of disks and nutrients, that the sensitivity of this test will be increased.

In one experimental series, a plain paper disk, ¼-inch in diameter, moistened only with a milk containing 0.1 I.U. of penicillin per milliliter, gave a zone of bacterial inhibition with a diameter of 1.3 cm. Using a disk dried in 20 per cent peptone solution on the same milk, a 1.1-cm. zone was achieved; a disk dried in a 20 per cent peptone—20 per cent dextrose solution and moistened with the same milk provided a zone diameter of 1.0 cm. Growth was slowest with disks impregnated only with milk. In addition, at concentrations of penicillin of over 0.5 I.U. per milliliter, disks saturated with milk alone or with milk and a 20 per cent peptone solution gave no halo effect. However, there was no growth in the areas of the disks, so the milk would have been considered penicillin-positive regardless. With 20 per cent peptone—20 per cent dextrose disks, growth was most rapid, sensitivity was slightly reduced, and the characteristic halo effect was present with all milk containing concentrations of penicillin up to 1.0 I.U.

Other nutrients also were applied directly to plain paper disks, in powdered form. These included spray-dried whey, dried whey agar, and l-alanine. In all trials, results were less favorable than with peptone and dextrose discs.

*Obtaining Results in 2½ to 3 Hours.*—Results are obtained significantly faster, if desired, with the aid of a microscope

*Three sizes are available, 1/4-, 1/3-, and 1/2-inch.

utilizing the low-power objective. A plate, after 3 hours' incubation at 95 to 98.6 F., had its cover removed and the lower agar portion inverted on the microscopic stage. In normal antibiotic-free milk, using the low-power objective and without staining, minute thread like colonies were observed next to and in the close vicinity of the disk. These tiny threads are not to be confused with small, round, black dots that often appeared in the agar field. With continued incubation, the early threadlike colonies eventually assumed a rotund-bodied form with hairlike projections. Results have been obtained in slightly over 2 hours after incubation, with the use of the microscope, but these were exceptional cases.

If the growth of the test organism (*B. subtilis*) is slow for any reason, including the use of incubation temperatures lower than those recommended, visual detection will be delayed. Naturally, under these conditions, low-power microscopic detection of colonies also will be delayed.

*Durability of Spores.*—Bacterial spores theoretically should survive and not germinate in the absence of nutrients, even after exposure to room temperature or higher. Plates, containing seeded plain saline agar and sealed in nonpermeable aluminum foil packets, were held for 5 days at 41.0, 71.6, and 95.0 F. Following this period fresh normal milk and milk containing penicillin were tested on these plates. At all 3 temperatures, germination of spores into vegetative bacteria had not occurred when plates were removed from their packets. However, when nutrient disks moistened with milk were applied to the agar surfaces, growth of *B. subtilis* occurred rapidly in 3 hours, regardless of storage temperature. In 6 hours, distinctive halos or inhibition zones were observed visually on milk containing penicillin (table 3). The durability of these spores at the listed temperatures is under continued study.

**TABLE 3 — The Effect of High Storage Temperature upon the Reverse-Phase Disk Assay**

| Type of milk | Diameter (cm.) B. subtilis zone of inhibition* using plates stored 5 days at 41.0 F. | 71.6 F. | 95.0 F. |
|---|---|---|---|
| 20% Peptone-20% Dextrose Disks | | | |
| Fresh normal milk | 0.7 | 0.7 | 0.7 |
| Milk containing 0.1 I.U. penicillin/ml. | 1.2 | 0.9 | 1.1 |
| With 20% Peptone Discs | | | |
| Fresh normal milk | 0.7 | 0.7 | 0.7 |
| Milk containing 0.1 I.U. penicillin/ml. | 1.2 | 1.2 | 1.2 |

*A value of 0.7 cm. represents the diameter of the disk itself without zoning. Good growth next to disk was observed in all instances where value of 0.7 is listed.

## Discussion

The significance of the results from the present method points to a possible development of a simple test with a high degree of sensitivity and flexibility. How well it will fit in with other designs for simple antibiotic tests underway in the authors' laboratory, some of which utilize vacuum and gas principles,[3] will await the results from extensive field trials now being studied.

Preliminary results indicate that an inexpensive, simple detection test for antibiotics in milk may soon become available to the veterinarian, public health official, dairy supervisor, and farmer for use in the field. However, a number of precautionary measures are necessary for making a reliable field test. These will be presented later in detail.

## Summary

The principle and details of a new test for detecting antibiotics in milk, called the "reverse-phase disc assay test," are described. This test was designed to provide flexibility in field testing for antibiotics. Storage temperature no longer exerts a great influence on seeded bacteria because nutrients are eliminated from the agar and deposited on test disks instead. Results may be obtained in 6 hours without optical aids and in 2½ to 3 hours utilizing microscopic examination.

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*Working Together for*

# Healthier Livestock

C. D. VAN HOUWELING, D.V.M.

THE U. S. Department of Agriculture uses two general types of approach in discharging its responsibility for maintenance and protection of livestock health. One is research, which seeks new knowledge on livestock breeding, feeding, and management, as well as information on prevention and treatment of diseases. The second is regulatory in nature, and seeks to keep out, prevent, eradicate, or control diseases and pests which threaten livestock health.

### Research Contributes to Healthier Livestock Selection and Breeding

Research contributes in several ways to the over-all goal of healthier livestock. It develops better animals through selection and breeding. One example is the meat-type hog, developed to meet the demand for more lean, tender meat and less fat. Scientists are studying the role of inheritance in beef tenderness and in feeding efficiency. Breeders are selecting dairy cows to increase the yields of nonfat solids in milk. At the same time, they are seeking new techniques and improved methods for early identification of superior purebred and crossbred individuals in all types of livestock, including poultry.

Livestock producers are watching with interest the studies being made on heat tolerance with both beef and dairy cattle. These include the introduction of heat-tolerant Zebus and various combinations of Zebus with European breeds, selection within existing breeds for adaptability and productivity, and hybridization of existing breeds.

With sheep, breeders are seeking ways to improve efficiency of gain and of wool quality through selection and crossbreeding. Improvement is limited by several factors. There is a need to define lamb meat quality and how to measure it in the live animal. Many production traits cannot now be measured in young animals where it is economically desirable to do most of the culling.

Swine-improvement work includes performance testing and selection of breeding animals for superior growth, feeding efficiency, and back fat. Considerable emphasis in research is being placed on development of better selection procedures for improving carcass quality. Two mechanical devices have proved useful in measuring back fat in the live animal. They also are proving valuable in identifying superior meat-type breeding stock.

Poultry breeding research has established hybrid breeding as a means for improving egg production. Here again, breeders want improved methods for early identification of superior individuals and crosses. This work includes investigations of blood grouping and hormones.

### Feeding and Improved Management

Research is also showing the way to better feeding and better management. Ouput per breeding unit has increased almost 40 per cent since 1935-1939. This breaks down to over 45 per cent more beef per cow, almost 30 per cent more pork per sow, well over 50 per cent more eggs per hen, and about 40 per cent more milk per dairy cow.

These gains are due to many factors—

The author is assistant administrator, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.

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animals with greater production capacity, more and better feeds, better control of diseases and insect pests, and improved management practices all along the line.

Fifty years ago it took 8 to 12 months to fatten a hog for market. Today, due to better feeding and management methods, as well as marketing at a lighter weight, it takes 4 to 6 months. It used to take nearly 1,100 lb. of feed to get a 1,000-lb. steer ready for market; today, it can be done with 800 lb. Even during the lifetime of the broiler industry (about 25 years), producers have saved almost 2 lb. of feed per pound of broiler.

New devices and techniques are enabling scientists to investigate more fully the role of nutrition in producing meat and milk. One of these devices is the energy metabolism laboratory for cows at the research center at Beltsville, Md. Automatic recording equipment measures every action—breathing, eating, and drinking—of each cow in the glass-enclosed chamber. When science learns how much feed it takes for body maintenance, the balance will represent the food that goes to milk or meat production.

Much research is being done on the use of antibiotics, hormones such as stilbestrol, minerals, tranquilizers, and other feed additives. For example, stilbestrol is widely used to increase the rate of gain and feed efficiency of beef cattle; but conflicting results have been obtained from its use for feeder lambs and results with swine are not clear.

There is need for a careful and thorough testing of new products before they are marketed and used as feed additives. The feed industry bears a responsibility to producers to avoid damaging situations that might arise from the improper use of additives. Veterinarians are vitally concerned with this question. To properly serve livestock owners, veterinarians need to keep pace with developments in this field to prevent undesirable residues that might result either from high-level feeding or therapeutic and preventive treatment. The U.S. Department of Agriculture stands ready to cooperate with industry in properly evaluating such products before they go into use.

Research in all of these fields offers opportunities for livestock improvement. However, the area of greatest gain to the livestock industry lies in disease prevention and reduction of losses from diseases and pests. Here, research and regulatory programs are closely bound together.

#### Research and Regulatory Programs

Disease and parasite research within the U.S. Department of Agriculture and cooperative work with the states is being expanded. Three years ago, the Plum Island, New York, Animal Disease Laboratory was opened for intensive study of foreign diseases. Dangerous diseases not now existing in this country are being studied on this island without fear of contaminating domestic livestock populations. This laboratory's primary target is foot-and-mouth disease. It also provides differential diagnosis of diseases which cannot readily be distinguished from those more dangerous exotic diseases.

A new National Animal Disease Laboratory is under construction at Ames, Iowa, for basic research on domestic diseases. Workers will also study aids in disease diagnosis, and test biologic products for veterinary use. This plant is expected to be ready for use late in 1960.

A major laboratory for the study of parasites is at Beltsville, Md. When the animal disease research studies there are transferred next year to Ames, the parasitologists will be able to expand their coverage in this field.

The Department also maintains several smaller laboratories for specific studies, such as work on hog cholera, poultry diseases, and parasitic diseases of cattle. Several others work on problems economically important to the region in which each is situated.

The federal government participates in cooperative research on animal diseases and parasites with the state experiment stations. In addition, valuable contributions have been made by the states through independent research in their colleges and universities and by commercial veterinary supply firms working in these areas.

An important segment of disease and pest research is carried on cooperatively with a number of foreign countries. This includes studies of East African swine fever in Africa, of foot-and-mouth disease in England, Holland, and Denmark, and of scrapie at Compton, England—all diseases

that are potential threats to this country's livestock.

Some of the foreign work is by contract agreement, taking advantage of Public Law 480. This law permits use of foreign currencies received from sale of surplus agricultural products in those countries to pay for research done by their nationals. Such research covers problems on the farm, in forestry, marketing, home economics, and utilization. In areas where we could mutually benefit, we want to explore further possibilities of developing research programs for the protection of U.S. livestock and poultry that could be paid for with such funds.

Less formal arrangements have resulted in the exchange of scientists between our country and many others. Scientists in the Western Hemisphere have followed closely the foot-and-mouth disease studies in Argentina since their beginning. The United States shares a long history of highly satisfying relationships with scientists from other American states, who, through the years, have worked side by side with our scientists and permitted our people to work in their home laboratories.

**Since 1939 . . . there has been an increase of over 45 per cent more beef per cow; almost 30 per cent more pork per sow; well over 50 per cent more eggs per hen; and about 40 per cent more milk per dairy cow.**

In this exchange, a continuous flow of information among the scientists has proved to be a most valuable factor in international progress in animal and human health. The Pan American Sanitary Bureau has served well as a clearing house for technical information and progress reports on research and regulatory programs dealing with animal diseases transmissible to man.

The Department's regulatory program is closely correlated to research findings in disease prevention and control. Federal government policy with regard to livestock diseases and pests is based on three key points—exclusion, eradication, and control.

Events and economics have contributed to the development of this policy. The people of the United States are meat eaters. For the past 10 years, average per capita consumption of red meat has been more than 150 lb. a year. This is not as high as the per capita average in some South American countries, but it represents a standard of meat consumption to which people in the United States have become accustomed. Livestock must be kept healthy to assure continuation of this standard, and adequate returns to producers.

#### Keeping Exotic Diseases Out

Last year a record number of animals—more than a million cattle, swine, sheep, goats, horses, and poultry—entered this country through all ports of entry. About 150 odd and unusual wild animal specimens were brought in for zoos. Inspectors turned back some 15,750 animals and poultry because they were diseased or had been exposed to disease.

Nearly every day travelers endeavor to bring prohibited materials past inspectors at incoming ports. They try almost anything. One man wore extra coats, and his many pockets yielded several pounds of forbidden tropical fruits and nuts.

Imported animals and materials can be the carriers of costly diseases and pests. For instance, among the interceptions were cattle carrying fever ticks, scabies, brucellosis, and tuberculosis, and poultry with highly virulent forms of Newcastle disease.

Stringent U.S. regulations are aimed primarily at rinderpest and foot-and-mouth disease. The first defense against these diseases is to exclude them. Rinderpest has never come in to the United States, and it has been 30 years since the last outbreak of foot-and-mouth disease. As a result of cooperative international action, the entire northern half of the Western Hemisphere remains clean—one of the few free areas of the world.

The vigorous program of basic research at the Plum Island laboratory in New York is helping to provide a better understanding of these diseases and to show the most effective means of protection.

Eradication, where practical, is the goal with diseases that have become established. Brucellosis has taken its toll from the livestock industry for many years. A few years ago, estimated annual losses from this disease alone were about $100 million. This

situation has improved. Since 1935, the rate of infection has been brought down from 11.5 per cent of the cattle tested to 1.6 per cent.

This success is the result of research and coordinated action. Nearly 5 times as many cattle are being tested today as in 1935. Add to this nearly 2 million herds screened by the milk ring test—a product of research—and the millions of animals protected with strain 19 vaccine.

The number of cases of undulant fever in man has declined with the drop in brucellosis infection. The only recognized source of this disease for people is infected animals. Between 1943 and 1958, as the rate of cattle infection dropped, the known human cases of undulant fever dropped from 6,300 to less than 800.

From this point on, in addition to the disease, it will be necessary to fight the attitude that considers the battle won. This has been the case, to some degree, with tuberculosis. The rate of tuberculosis infection in cattle was brought down to a low point of 1.1 per thousand in 1952. Since 1955, a slow but steady increase has brought it up to 1.7 per thousand.* This is the difficult stage, when the last centers of infection, necessary for eradication, seem to elude detection. The problem is complicated by the nonspecific reactions to the tuberculin test.

Many centers of infection are discovered by tracing back to their origins animals found, at the slaughterhouse, to be infected. The trace-back, an adjunct to the tuberculosis-testing program, yields, on the average, about 3 reactors for every 100 cows tuberculin tested. A similar trace-back program is now underway for brucellosis reactors found among dry and cull cows going to commercial slaughter.

Scrapie, first reported in sheep in this country in 1947, is still regarded as a foreign disease. During these 12 years, it has appeared in 78 flocks in 21 different states. Under a cooperative state-federal eradication program, begun in 1952, infected and exposed sheep are slaughtered. Flocks possibly exposed are kept under surveillance for 42 months; 1,700 flocks are now on inspection schedules.

Diseases and pests combined cost U.S. livestock producers around $2 billion a year. They reduce the nation's meat supply by claiming 1 animal out of every 5 produced.

*Since August, 1959, the rate has climbed to 2.3 per thousand cattle tested.

### Contribution of Biologic Products

Some new chemicals offer bright prospects for the control of livestock pests. They destroy the insects or parasites on contact or act systemically in the animal's tissues. Two of these new chemicals are useful for cattle grubs: ronnel will control cattle grubs through systemic action when given orally in the form of a bolus; Bayer 21/199 will kill 75 to 100 per cent of young cattle grubs by a single spray treatment, which is absorbed and acts systemically in the animal's tissues.

Bayer 21/199 also kills ticks and horn-flies on contact; a spray provides protection for 2 to 3 weeks. Usually, a single spray will provide a high degree of control of sheep keds and of lice on sheep, goats, and cattle. It is not recommended for use on dairy cattle or milk goats, since it appears in the milk for a week or more following treatment.

This points up the question of residues, and accounts for some of the national attention being given to biologic controls.

The biologic approach has been highly successful in fighting the screwworm which invaded the Southeast in 1956. Damages to livestock were estimated at around $20 million a year. This cooperative state-federal program uses male flies, sterilized by exposure to radiation, to systematically reduce the native screwworm fly population. The irradiated flies are harmless.

**Between 1943 and 1958, as the rate of bovine brucellosis declined, the known cases of undulant fever in man dropped from 6,300 to less than 800.**

In 1958, airplanes dispersed about 2 billion sterile screwworm flies over nearly 85,000 square miles. Campaign workers had to raise and sterilize 50 million flies a week to meet this schedule.

The successful campaign was built on years of research in more than one field. Entomologists first showed that pupae of

the screwworm exposed to a given amount of radiation produced sterile flies. They also showed that native females mated with sterile males produced eggs that would not hatch. This was the key. Tests established the feasibility of large-scale treatment.

**The increase in total production of veterinary biologic products multiplies the responsibility to see that high standards are maintained in their production and testing.**

Mexico and the United States have coordinated field studies of the screwworm to survey specified areas on each side of their common border. These surveys were made to show whether the sterile male technique or some adaptation of it could be applied to border areas to eliminate the pest there. The actions to be taken will depend upon the support available for this work.

Campaigns of this sort permit direct, frontal attacks on livestock diseases and pests. But behind them, research continues.

Research and controls carried on in the production of veterinary biologic products —important tools in the control program— give major support to disease prevention. Production of vaccines, bacterins, serums, and diagnostic aids in 1958 totaled nearly 3 billion doses. The bulk of this production was in vaccines, about 99 per cent of which were modified live- or live-virus vaccines.

The increase in total production of veterinary biologic products reflects growing knowledge in this field. It also multiplies the responsibility to see that high standards are maintained in their production and testing. Licensing and inspection of veterinary drugs is a responsibility assigned by law to the Department of Agriculture to assure safety and potency, and hence protection for the animals serviced with these products.

#### Stockyards and Meat Inspection

Two other regulatory activities help limit the spread of disease and support other control efforts. These are public stockyards inspection and inspection of meat and meat products at packing plants.

The importance of livestock health in general and the effectiveness of stockyards inspection are pointed up by the fact that at the stockyards last year (fiscal 1958) more than 350,000 diseased animals were discovered during inspection and safely handled. Thousands of sheep and cattle were dipped for scabies, and thousands of swine immunized for hog cholera. About 34,000 contaminated trucks and railroad cars were disinfected. Had these disease carriers—both animal and mechanical—continued on their way uninhibited, untold damage could have resulted. The veterinarians handling these inspections are vital in preventing the spread of disease and in seeing that animals are humanely handled.

Meat inspection provides assurance to consumers that meat and meat products are wholesome, unadulterated, and properly labeled. The veterinarians and other inspectors in this work also play an important role in disease detection and control.

#### Conclusion

Animal-husbandry research, animal disease and parasite research, and the regulatory programs work together to give the consumer better livestock products. They help to improve the total climate for livestock production. Improving conditions here, and sharing research findings are steps in helping all American countries become better places in which to raise livestock.

In the future, with research to improve the tools and open new avenues of achievement, other long-time problems will be added to those marked for eradication. For instance, as knowledge of hog cholera is increased, the time will come when it can be wiped out. Over the past 40 years Canada, with a combination of slaughter, quarantine, and antiserum, has had to spend only half a cent per hog marketed to keep cholera eradicated. During the past 15 years, it has cost U.S. producers nearly 44 cents per hog of the more than a billion marketed, and the disease is still here. These costs do not include morbidity and mortality losses. This is further evidence

that it is cheaper in the long run to eradicate a costly livestock disease, when it is possible to do so, than to live with it.

There are still many diseases, such as leptospirosis, mastitis, anaplasmosis, and virus pneumonia, that plague our livestock. The future requires imagination, communication, and dedication: imagination for a bold approach to old problems; communication for a full and free exchange of scientific findings and experiences; and dedication to the highest ethics of the veterinary profession. All three will be required to achieve—in the Western Hemisphere—better health for man and his animals.

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## Amphotericin B for Coccidioidal Disease

At the present time, amphotericin B is the preferred therapy against serious forms of coccidioidal disease. Amphotericin B is effective against severe primary coccidioidal disease, in infection threatening to disseminate, and in disseminated disease including coccidioidal meningitis. It also has value as an aid to healing peripheral skin granulomas, abscesses and secondary sinuses, and lymphadenitis. As a "covering" drug, amphotericin B deserves consideration for use for 3 to 4 weeks prior to surgical procedures involving manipulation and removal of any lesion harboring viable *Coccidioides immitis*. The agent must be given intravenously or intrathecally. It must be given in sufficient doses and often enough to maintain an effective blood serum level of 0.5 to 1.0 μg./ml. Such a level should be sustained long enough to achieve serologic evidence of adequate response as indicated by a lowering of the complement-fixation titer.

Prolonging treatment until a desirable serologic reversal is achieved is justified, since prolonged treatment usually prevents relapse. Three to 4 months of therapy, without undue interruption, may be required. If relapse does occur, the course of therapy should be repeated.

The usual intravenous dosage of amphotericin B is a minimum of 1.0 mg./kg. for adult human beings and from 1.25 to 1.5 mg./kg. for children. One fifth of this dosage is administered initially, diluted with 500 to 750 cc. of 5 per cent dextrose in water. By the end of the first week, the full dosage can usually be given every 24 hours. —*Am. J. Med., 27, (1959): 617.*

## Bloat in Man Treated with Veterinary Drug

The use of silicones in treating intestinal gaseous distention in human beings was suggested by the successful use of the defoaming silicones in veterinary medicine and the use of silicones in man to facilitate gastroscopy.

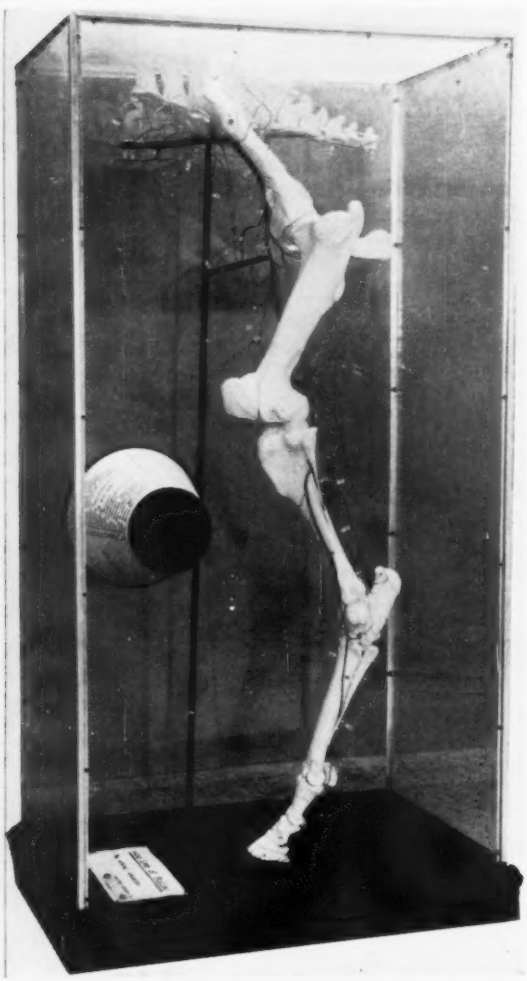
Good or excellent symptomatic results were obtained with oral methyl polysiloxane by 72 per cent of 117 human patients with excessive intestinal gas and bloating.

Methyl polysiloxane changes the surface tension of gas bubbles in the gastrointestinal tract, thus enabling them to coalesce. Free gas is formed in this way, and it is eliminated more easily than small bubbles by belching or by passing flatus. It is also possible that the liberated intestinal gas may be absorbed more readily into the blood stream and digestion of carbohydrates may be facilitated by alteration in surface tension.—*Am. Pract. & Dig. Treat. 11, (1960): 52.*

# Anatomical Teaching Aids

O. W. SACK, D.V.M.

THE STUDY of anatomy is assisted and simplified by the use of three-dimensional models. However, they are difficult to obtain commercially. This report describes how the author constructed 2 full-sized three-dimensional anatomical prototypes, 1 illustrating the arterial circulation of the pelvis and hindleg of the horse (fig. 1) and the other the distribution of the lumbar and sacral nerves of the ox.* These models have been helpful to all concerned with veterinary anatomy at the Ontario Veterinary College and are not as complex as the description and photographs suggest. A brief account of their construction is offered in the hope that it will elicit suggestions from readers for improvements, and also that it will encourage other anatomists to fabricate similar models.



### Skeleton

The bones were prepared in the usual manner, using *Dermestes vulpinus* (the leather beetle) to clean them. After degreasing, they were joined and fastened to one another by long bolts, a plastic rod being used for the vertebral column. The ends of the bolts were countersunk and the holes filled with putty so that none of the metal could be seen. Two coats of ivory latex paint were applied to give a uniform and natural appearance.

### Suspension

Because it comprised only 1 limb, the horse model (fig. 1) had to be supported by a steel rod attached to the plastic "spinal cord" and to the symphysis pubis. In the ox specimen, however, the glass case could

Dr. Sack is assistant professor, Department of Anatomy and Histology, Ontario Veterinary College, Guelph, Ont.

*The figures were constructed under the supervision of Dr. J. H. Ballantyne, head of the Department of Anatomy and Histology.

**Fig. 1—Full-sized model illustrating the arterial circulation of the pelvis and hindleg (horse).**

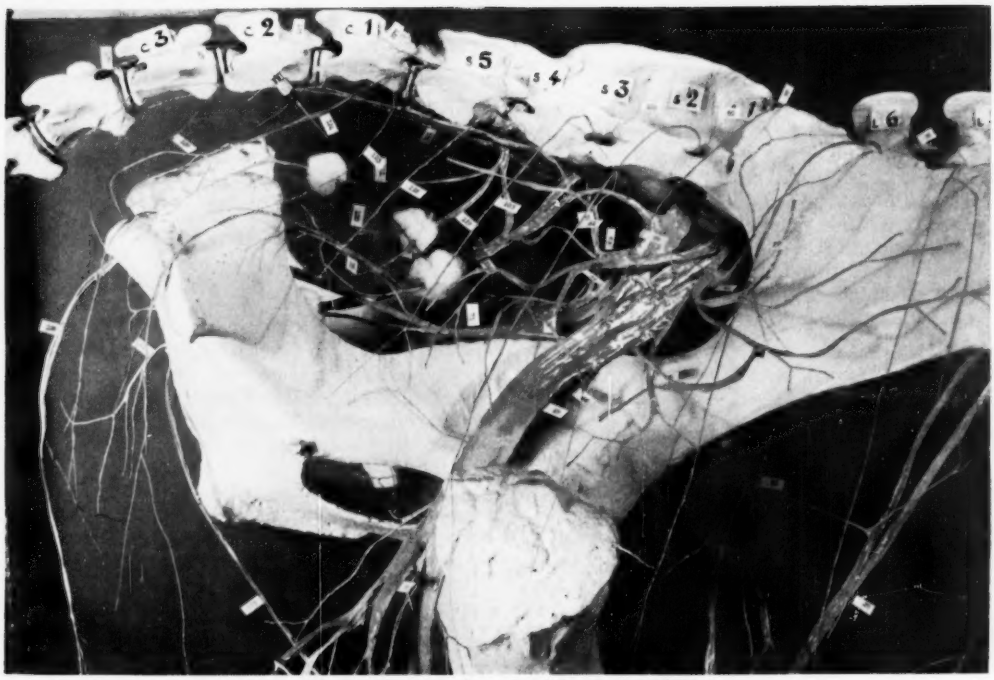



Fig. 2—Close-up view of pelvis of ox model.

Fig. 3—Close-up view of lumbar spine of ox model. Hypodermic needles show paravertebral nerve block sites.

be utilized to suspend the skeleton and this method proved satisfactory. The main support was given by 2 Steinmann pins, inserted from each side through the glass into the tubera coxae, and by a bolt which anchored the plastic rod to the anterior glass plate. For additional strength, a bolt was placed through the top sheet into the sacral spine. The feet rested on the floor of the glass case to carry part of the weight of the limbs.

#### Vessels and Nerves

After much experimenting with rubber tubing, string, paper, and other materials, the grouping together of many strands of fine, pliable wire were found to work well. For the sciatic nerve, approximately 120 wires were used. These wires were then parted in the same manner and at the exact points that the nerves were found to branch in the dissected cadavers and as described in various textbooks and articles.

In order to hold the wires together and also to provide a relatively smooth, paintable surface, the strands were coated several times with colorless latex. It rendered the simulated vessels and nerves almost indestructible, and they could subsequently be handled with ease.

Finally, after these structures had been attached to the skeletons and bent into place, they were painted with enamel—red for the arteries and yellow for the nerves. At least 5 coats were necessary to provide a good appearance.

#### Labelling

Numbers were typed on small pieces of thin cardboard and attached to the structures with transparent tape in such a way that the labels were completely enclosed by the tape. This technique prevents fading (fig. 2).

For the horse model, a revolving legend was constructed around a central shaft and suspended between the 2 lateral glass sheets. By means of knobs attached to the protruding ends of this shaft, the legend can be turned and read from either side of the model (fig. 1). For the ox model, the legend was simply printed on heavy cardboard and nailed to a board which was placed gable-fashion on the floor of the case.

#### Nerve Blocks

One of the reasons for preparing the ox specimen was to illustrate the various nerve blocks performed on these animals in veterinary practice. Hypodermic needles of the recommended gauge and length were affixed to the model in the appropriate locations (fig. 3).

The imaginary lines as visualized by the surgeon in performing the paravertebral nerve block, for example, were indicated by thin copper wires which were strung between the bony landmarks. The shafts of the needles were fastened where these wires intersected and the points inserted into the lumbar spinal nerves. To simulate the deposited anaesthetic, small pledgets of cotton were glued around the nerves.

To illustrate Larson's pudendal nerve block, the point of a long needle was made to pierce the pudendal nerve and the other sites to be blocked were shown by pieces of cotton (fig. 2).

The caudal block was also demonstrated on this model.

#### Glass Case

Each model was enclosed by a large plexiglass case which rested on a caster-equipped platform. The edges of the sheets were joined by one of the commercially produced extruded aluminum mouldings. One end of the case is removable so that access to the interior is possible.

Plexiglass is expensive but is preferred to ordinary glass because it will not break and can be cut and drilled with simple tools.

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*The Application of*

# Radioactive Isotopes

## *as Diagnostic Aids in Veterinary Medicine*

James R. HOLMES, PH.D., M.V.SC., M.R.C.V.S.

RADIOACTIVE ISOTOPES are playing an increasingly important role in clinical medicine. For obvious reasons, the greatest advances to date have been made in human medicine, but possible application of these substances as aids in diagnosis and investigation of animal diseases is now beginning to be acknowledged.

In human medicine, isotopes are used essentially in three main fields: diagnosis, therapy, and physiologic and pharmacologic investigations.

It is with the use of radioisotopes as aids in diagnosis that this paper is mainly concerned and particularly with their possible applications in veterinary medicine.

Many papers and numerous textbooks are now available describing the applications of radioactive isotopes in human medicine.[1,3,8,15,25,33,47] Some of their present uses are listed (table 1).

### Veterinary Medical Applications

At the present time many veterinary applications of radioactive isotopes reported in the literature have been carried out as physiologic studies, but techniques used in most cases could be applied in disease investigation or diagnosis. Some methods applicable to veterinary diagnostic procedures using isotopes in thyroid, kidney, and liver function tests, cardiac output, blood and plasma volume estimations, and diagnosis of pernicious anemia have been described.[11] Some studies already have

From the Laboratory of Radiation Biology, New York State Veterinary College, Ithaca. Dr. Holmes is now with the Department of Veterinary Medicine, University of Bristol, Somerset, England.

The writer thanks Dr. C. L. Comar, director of the Laboratory of Radiation Biology, New York State Veterinary College, for his stimulating help and advice in the preparation of this paper which was written during the tenure of a Kellogg Foundation Fellowship and Wellcome Travel Grant while the writer was on leave from the Department of Veterinary Medicine, University of Bristol, England.

**TABLE 1—Diagnostic Applications of Radioactive Isotopes in Man**

| Technique | Isotope used |
|---|---|
| THYROID FUNCTION | |
| Iodine uptake and thyroxine production | $I^{131}$ |
| Thyroid tumor metastases | $I^{131}$ |
| RENAL FUNCTION | |
| Kidney function | $I^{131}$ Diodrast and $I^{131}$ Hypaque |
| Renal plasman flow | |
| LIVER FUNCTION | |
| Liver function | $I^{131}$ rose bengal |
| Liver blood flow | Colloidal $Au^{198}$ |
| CIRCULATION STUDIES | |
| Radiocardiography | $I^{131}$ labelled human serum albumin or $Na^{24}$ |
| Right heart radiocardiography | $Au^{198}$ adsorbed on C |
| Left heart radiocardiography | $I^{131}$ methyl iodide by inhalation |
| Cardiac output | $I^{131}$ labelled human serum albumin; $Na^{24}$ or $K^{42}$ |
| Circulation time | $Na^{24}$ or $I^{131}$ |
| Local circulation | $Na^{24}$ |
| Saphenous circulation time | $I^{131}$ labelled human serum albumin or $NaI^{131}$ |
| Cerebral, liver, coronary and pulmonary blood flow | $Kr^{85}$ or $Xe^{133}$ by inhalation |
| Alimentary hemorrhage or operative blood loss | $Cr^{51}$ |
| Placental function studies | $Na^{24}$ into chorio allantoic space, or uterine musculature, or maternal blood system |
| Plasma volume | $I^{131}$ labelled human serum albumin |
| Erythrocyte volume | $Cr^{51}$ or $P^{32}$ |
| Erythrocyte survival | $Cr^{51}$ |
| Survival of transfused erythrocytes | $Cr^{51}$ or diisopropylfluorophosphonate $P^{32}$ |
| Plasma protein turn-over studies | $I^{131}$ labelled human serum albumin |
| MISCELLANEOUS | |
| Visualization of blood pools | $I^{131}$ labelled human serum albumin |
| Myeloscintigrams | $I^{131}$ labelled human serum albumin |
| Determination of body fat content | $Kr^{85}$ by inhalation |
| Body composition and electrolyte studies | $Na^{24}$ or $K^{42}$ or $Br^{82}$ or $H^3$ |
| Iron turnover studies in haemolytic diseases, anemias, etc. | $Fe^{55}$ or $Fe^{59}$ |
| Intracavity instillation and delineation | $Au^{198}$, $Y^{90}$, $P^{32}$, $I^{131}$ labelled human serum albumin |
| Diagnosis or pernicious anemia | $Co^{58}$, $Co^{58}$ or $Co^{60}$ labelled vit. $B_{12}$ |
| Fat digestion and absorption | $I^{131}$ Triolein |
| Pancreatic function | $I^{131}$ Casein or $I^{131}$ human serum albumin |
| NEOPLASM DETECTION | |
| Localization of bone malignancy | $Ca^{45}$ or $Ca^{47}$ |
| Avascular necrosis of femoral head | $P^{32}$ |
| Detection of malignant intraocular neoplasms | $P^{32}$ |
| Differentiation of neoplasms | $P^{32}$ |
| Detection of hepatic neoplasms | $I^{131}$ human serum albumin; $I^{131}$ rose bengal or $Au^{198}$ |
| Brain tumor localization | $As^{72}$ or $As^{74}$ or $Hg^{203}$ labelled Neohydrin |
| Delineation of brain tumors during surgery | $P^{32}$ or $I^{131}$ human serum albumin |
| Thyroid metastases | $I^{131}$ |

been reported with indications of possible clinical applications (table 2). Other techniques at present, mainly of a physiologic nature, may find clinical uses later.[6,29,48]

Much basic information needs to be collected before data concerning diseased animals can be interpreted because application of radioisotopes as tools in veterinary investigation and diagnosis is in its infancy.

Certain differences in veterinary practice, as compared with human medicine, may limit or alter possible uses of radioisotopes in veterinary medicine. These factors include:

1) *Economic Considerations.*—With the possible exception of the dog and cat, the scope of veterinary practice is largely governed by the value of the animal in relation to the cost of treatment. Thus, therapy may not be adopted if it is not economically sound even though it might be successful. On the other hand, if one considers a herd or flock problem and the total number of food animals involved, then one may be able to afford expensive diagnostic and therapeutic measures if they are inexpensive on a *per capita* basis.

2) *Euthanasia.*—Apart from economic considerations, euthanasia is usually performed where the prognosis is hopeless, as it is in extensive malignant neoplasia in the dog.

3) *Past History.*—Records of previous illnesses and the opportunity to follow up cases are not as well developed in veterinary as in human medicine.

4) *Hospital and Laboratory Facilities.*—In general, better laboratory and hospital facilities are available for the human patient so that more data are usually accumulated concerning specific human diseases.

5) *Cooperation with the Clinician.*—The human patient generally cooperates with the clinician. This is usually not true in veterinary practice, and the veterinarian often has to adopt restraining measures which may interfere with an accurate clinical examination of the animal.

6) *Geriatrics.*—In veterinary practice, diseases of old age are mainly confined to pet animals.

7) *Postmortem Examinations.*—The opportunities to carry out postmortem examinations are probably greater in veterinary practice.

8) *Restrictions.*—Different government agencies have recommended different tolerance values for certain radionuclides in food and water but the Food Additives Amendment of 1958 (Public Law 85-929) requires that no substance may be administered to human food which is carcinogenic. Thus, the meat of animals which have received radioactive elements may not be used for human food nor can their products, such as milk, be consumed. Radioactive elements have a biologic half-life within the body, but they are never completely eliminated and, due to their exponential decay, activity theoretically never completely disappears. This, therefore, modifies the uses to which radioisotopes as diagnostic aids may be

employed in food-producing animals and will, in general, restrict their application to herd or flock problems where animals may be sacrificed to make a diagnosis. It is quite likely, however, that permissible levels will eventually be established. In pet animals and in horses, as in man, this problem does not arise.

No collection of diagnostic "machinery" will relieve the clinician of the responsibility of basing his final judgment of a case on use of his senses of touch, sight, hearing, and smell. In the majority of cases, these alone, backed by experience, will permit a diagnosis and prognosis to be made. There is no intention of belittling the numerous diagnostic aids now available but rather to emphasize that they are merely aids and do not provide a ready-made answer to the problem of diagnosis. The greatest value of ancillary aids is to make a diagnosis more certain so that treatment becomes less empirical.

Many diagnostic aids employed in human medicine are now in use in veterinary practice, including immunologic reactions, hematologic investigations, biochemistry, radiology, pathology, bacteriology, and electrocardiography. The question arises as to whether radioactive isotopes can be added to this list and prove of benefit, bearing in mind that they differ from all the other techniques mentioned (with the exception of radiology), in that there is a potential radiation hazard that must be taken into account.

In clinical veterinary medicine, the main applications of radioisotopes would appear to be in two fields of interest: (1) for diagnostic purposes, where presently available equipment is inadequate or techniques are prolonged and laborious, as in the investigation of efficiency of the circulatory system in the horse or thyroid function in the dog; and (2) for clinical research, where the isotope is used to gain basic information on functional abnormalities resulting from or associated with a disease process, such as the study of circulation dynamics in recognized heart diseases.

Application of radiobiologic techniques in veterinary medicine should fulfill the following:

1) They should be applicable to animals "reasonably" restrained. Where it is essential that the animal remains completely still during the period of the examination, general anesthesia may be utilized. In other cases, tranquilizers may suffice. As often as possible, it is preferable to use the normally conscious animal because anesthetics and tranquilizers may modify the response.

2) Data must be collected on a sufficient number of normal animals of the species before results obtained in diseased animals can be interpreted. Furthermore, where a technique repeatedly calls for anesthetic or sedative, normal data should be gathered under the same conditions.

3) The use of isotopes in veterinary medicine should be restricted to hospitalized animals to prevent the widespread dissemination of potentially dangerous materials.

4) Dosage should be as low as possible and must not produce a hazard to the owner or attendants.

5) Equipment used must be rugged for field work.

6) In making observations on the conscious subject, some movement may have to be accepted which

**TABLE 2—Some Isotope Techniques Used in Animal Studies with Possible Clinical Applications**

| Species | Isotope | Procedure (reference) |
|---|---|---|
| Sheep, Pigs, Cattle, Burros | $P^{32}$ labelled erythrocytes | Blood volume determinations (19) |
| Horse | $P^{32}$ labelled erythrocytes | Blood volume determinations (10) |
| Ducks | $I^{131}$ human serum albumin | Blood volume determinations (31) |
| Calves | $Cr^{51}$ labelled erythrocytes | Blood volume determinations (39) |
| Goats | $Cr^{51}$ labelled erythrocytes & $I^{131}$ human serum albumin simultaneously | Blood & plasma volume determinations (23) |
| Dogs | $Cr^{51}$ labelled erythrocytes | Cardiac output, circulating pulmonary blood & plasma volumes (34) |
| Dogs | $Cr^{51}$ labelled erythrocytes | Detection of gastrointestinal hemorrhage (28) |
| Pigeons, Ducks, Rabbits | $Cr^{51}$ labelled erythrocytes | Survival of erythrocytes (26) |
| Pigs | Haem labelled with glycine 2-$C^{14}$ | Survival of erythrocytes (7) |
| Dogs | $I^{131}$ rose bengal | Liver function test (35) |
| Dogs | $K^{42}$ | Disappearance from circulation (37) |
| Dogs | $Na^{24}$ | Transcapillary exchange (17) |
| Cattle, Pigs | $I^{131}$ | Thyroid secretion studies (38) |
| Sheep | $I^{131}$ | Factors affecting thyroid secretion (22) |
| Rabbits | $P^{32}$ | Uptake in ocular tumors (41) |
| Dogs | $C^{14}$-glucose | Rate of glucose oxidation (36) |
| Dogs | $Au^{198}$ | Blood clearance & tissue distribution (16) |

may result in a slight impairment of accuracy; this might be preferable to possible complicating effects of restraint or anesthesia.

#### Instrumentation

Specific elements concentrate in various organs and tissues, *i.e.*, iodine in the thyroid gland, rose bengal in the liver, or diodrast in the kidneys. The radioactive isotope or the radioisotope-labelled substance will concentrate similarly. The location, shape, and degree of concentration of these radioactive agents can be determined by measurement of activity.

A variety of instruments, the design and efficiency of which have been greatly improved in recent years, are now available for the detection and measurement of radioactivity. Essentially, the two instruments most commonly used are the Geiger-Mueller tube and the scintillation counter. Description of these instruments and details as to their operation may be found in numerous textbooks.[2,5,14,30,32,40]

For external counting, the scintillation detector is efficient for *gamma* radiation. Where greater accuracy is necessary, the scintillation probe may be connected through a pulse height analyzer (*gamma* ray spectrometer) in which only photons of a given energy will be counted. To provide a visual record of activity, the probe can also be connected to a count rate meter and automatic recorder (fig. 1).

In clinical procedures, it is obviously desirable to use small doses of isotopes in order to minimize radiation hazard to the patient and individuals in the immediate environment and to reduce the problem of disposal of possibly radioactive excreta. Thus, sensitivity of the detecting device is very important. The greater sensitivity of the scintillation detector over the Geiger-Mueller tube for *gamma* radiation permits marked reductions in dosage.

*In vivo* measurements are most often concerned with the rate of change of an isotope in a given organ or tissue, either its accumulation, its disappearance, or both. In other cases, the actual degrees of concentrations are required. Often total size of the organ concentrating the activity is not accurately known so that total uptake may be all that can be measured. If the isotope is administered intravenously and concentrates in a particular tissue, its

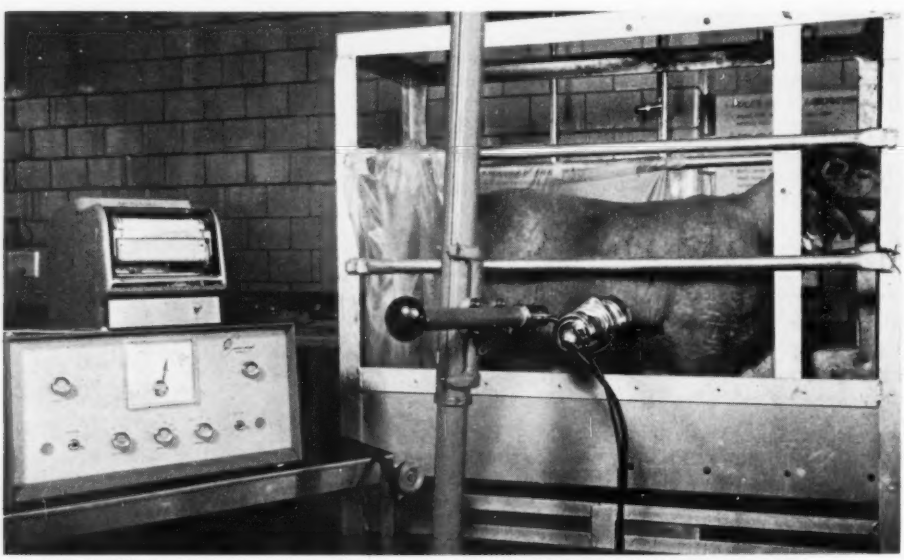

**Fig. 1—Illustrating external counting by using the scintillation probe, count rate meter, and recorder. In this experiment, liver function is being determined in the sheep following the intravenous injection of rose bengal labelled with $I^{131}$ (per jugular catheter). The probe is scanning the lower part of the liver area, ventral to the gallbladder.**

disappearance from the blood may be measured; also its tissue concentration.

The area scanned by a counting device can be modified by collimation (focusing) of the detection instrument and by altering the distance between the end of the counter and the tissue or organ under study. The optimum distance between the end of the probe and the animal body depends on several factors. The distance ultimately adopted usually represents a compromise between sensitivity and error due to uncertainty of organ location. While short distances increase errors due to organ size, long distances decrease sensitivity and "aiming" is more difficult. A collimated probe has directional properties and may be used to localize radioactive deposits.

In using a scintillation probe, an area may be scanned manually by moving the probe over different parts of the area and recording the activity. In human medicine, automatic scanning is practiced. The probe moves over the area, and an electromagnetic dot-printer records a mark for a preset count. Density of dots is an indication of distribution of activity in the area surveyed. Such a chart is known as a scintigram. In using automatic scanning, anesthesia would be essential in veterinary work because the subject must remain still throughout the period of examination and because slow travel speeds of the probe are essential for highest reliability.

By suitable collimation, scintillation probes may also be used to scan at a given depth in the tissue, determined by distance of the organ from the scintillating crystal and the focal length of the collimator used.

In clinical medicine, and particularly for *in vivo* studies, many of the observations made are comparative rather than absolute. The results obtained from the isotope in the body are compared with a similar amount of the same isotope placed in a suitable phantom outside the body. It is important that the phantom used should be of the same density as the tissues and conditions of observation should be identical to those made on the intact animal.

#### Radiation Protection in Veterinary Work

The potential hazard of radioactive isotopes must be thoroughly understood by all who work with these materials. The effects are insidious because no obvious immediate indication of their presence or activity is apparent. Users of these substances, therefore, have particular responsibility to prevent exposure of personnel who may be in the environment, such as animal owners and stockmen.

Techniques of handling isotopes to avoid contamination and methods of restraining and housing animals for isotope experiments have been described.[12,18,20]

Generally, to minimize possible contamination in diagnostic procedures, the following rules apply:

1) The work is carried out in a definite area and only authorized personnel are admitted.
2) Only tracer doses of the isotope are used whenever possible.
3) A short-lived isotope is preferred if one is available for the purpose.
4) The operator should wear protective clothing and rubber gloves.
5) Radiation monitoring equipment must be available to check for contamination.

Isotopes may leave the body by several routes, mainly by decay or through excretions and secretions: urine, feces, breath, milk. These products should be monitored after each experiment, and the animal should not be released until a suitable low concentration is reached. For man, the U.S. Department of Commerce (National Bureau of Standards) has recommended maximum permissible isotope concentrations, which may be disposed of by ordinary channels, and body concentrations of isotopes with which individuals may return to the general community without danger to their fellowmen. Information is available in appropriate handbooks.[42-46] These same values may be applied to animals because it is the potential danger of the released animal to the human population which is of importance. Precautions become routine in practice and, eventually, it is possible to weigh the cost and bother of protection against the benefits of isotope application.

#### Possible Applications in Veterinary Medicine

Many of the techniques applied in human medicine (table 1) would probably be applicable to domestic animals, also.

Little is known concerning thyroid function in various disease conditions in livestock and much valuable data could be obtained in this field. Particularly in the dog,

an investigation of the possible relationship between the thyroid and certain skin disorders would be of interest. The measurement of thyroid activity using $I^{131}$ is relatively straightforward. The concentration of isotopes in the gland following intraperitoneal inoculation is determined by external counting.

Renal function is of major importance in all species. One of the earliest signs of disease is change in the composition of the urine. Information on renal blood flow and kidney function would be of value in both diagnosis and prognosis.

Although the liver has a multiplicity of functions, there is a large reserve of tissue so that a considerable amount of damage generally occurs before function is impaired. By this time, there is often obvious clinical evidence of hepatic disease. A liver function test which would provide an indication of early liver damage is urgently needed, and an investigation of the value of radioisotope techniques would seem to be worthwhile. One recognized test uses rose bengal, a dye which is selectively removed from the circulation by the hepatic cells and excreted mainly via the bile and the alimentary canal. The test is one of both liver cell activity and biliary tract patency. By tagging rose bengal with $I^{131}$, the accumulation and disappearance of the isotope in the liver may be recorded with a scintillation probe placed externally (fig. 1).

**Many of the radiodiagnostic techniques used in man may be applicable to domestic animals.**

The technique of radiocardiography consists essentially of the rapid intravenous injection of a small volume of radioactive substance. Its passage is followed through the chambers of the heart with a detecting device placed externally. Sodium[24] is most often used for this purpose. Intravenous injection will give a more distinct effect during passage through the right side of the heart rather than through the left, because by the time activity reaches the left side of the heart, dilution will have occurred in the lungs. Right and left radiocardiograms may be obtained separately, the former by using $Au^{198}$ adsorbed on carbon which will mainly be retained in the lungs, and the latter following inhalation of $I^{131}$ labelled methyl iodide[27] which will be absorbed from the lungs. By recording the change in activity graphically, actual cardiac output can be calculated. Similarly, circulation time and local circulation efficiency can be determined by the rate of appearance of an isotope at a given site after injection or the rate of disappearance of an isotope from an area. Alimentary hemorrhage may be detected by labelling erythrocytes with $Cr^{51}$ and detecting the presence of the isotope in the feces. Plasma volume is measured by blood sampling following injection of radioactive human serum albumin and is a straightforward dilution technique. Similarly, red cell volume may be obtained by labelling erythrocytes with $Cr^{51}$ or $P^{32}$.

For measuring organ blood flow, the use of $Xe^{133}$ has been discussed[13]; inhalation of $Kr^{85}$ has been used to determine cerebral and coronary blood flow.[21,24]

In the horse, it is probably in diagnosis of circulatory dysfunction that radioactive isotopes will be of particular value. Frequently, detection and interpretation of cardiac abnormalities in the horse is difficult, and electrocardiography often provides little additional information to that gained by routine clinical examination. Most cardiac abnormalities in the horse are functional rather than organic, so that function tests are of particular importance and all the methods described in man could be applied to the horse. In older dogs, particularly, a more accurate diagnosis in cases of circulatory dysfunction might be obtained by applying some isotope techniques.

Due to the fact that there is a slightly increased uptake by neoplastic tissue of $P^{32}$, this isotope may be used for localizing tumors. Malignant tissue tends to take up more $P^{32}$ than normal tissue, due to its greater metabolic rate which also increases with degree of malignancy. By determining distribution of the isotope, extent of the tumor process may be ascertained, obviating biopsy in cases where surgery would be contraindicated. Unfortunately, $P^{32}$ is a *beta* emitter and is therefore applicable only for very superficial lesions (skin tumors) or in conjunction with surgery, as in delineation of brain tumors. Phosphorus[32] is widely used in man for de-

tection of malignant intraocular tumors. Brain neoplasms may be detected by using positron emitters $As^{72}$ and $As^{74}$. Positrons are rapidly annihilated by collision with electrons, producing 2 photons which move in exactly opposite directions. Two scintillation probes are used for detection, placed at right angles to each other on either side of the head and connected to a coincidence circuit so that a count is recorded only if both crystals detect a photon simultaneously. By altering the position of the probes, the exact location of the tumor can be ascertained. This method is painless and sometimes will detect lesions which may not be revealed by arteriography or pneumography.[47] Recently, the use of the *gamma* emitter $Hg^{203}$ labelled chlormerodrin* has been described for brain tumor localization.[4] For external detection of deeply placed tumors, *gamma* emitting isotopes, such as $I^{131}$ human serum albumin, are used.

In bone malignancies, $Ca^{47}$ is presently the isotope most commonly employed in human medicine; $P^{32}$ may be used to determine the viability of the femoral head in avascular necrosis, although radiography would provide sufficient information in most veterinary cases.

To differentiate cardiac enlargement from pericarditis or hydropericardium and mediastinal tumors from aortic aneurysms, $I^{131}$ human serum albumin may be given intravenously and a scan taken over the chest. The scan is then superimposed on a chest radiograph, and the distribution of the intravenously administered isotope is compared with the radiological picture. This procedure is known as visualization of blood pools. In the same way, $I^{131}$ human serum albumin may be used to produce a myeloscintigram to detect lesions of the spinal canal by lumbar puncture into the subarachnoid space. Again, an automatic scanner with a scintillation counter is required.

Pernicious anemia in man may be detected by using vitamin $B_{12}$ labelled with $Co^{60}$ (or preferably $Co^{56}$ or $Co^{58}$ with shorter half-lives than $Co^{60}$). An injection of vitamin $B_{12}$ is given and the labelled vitamin is administered by mouth. In normal individuals, more than 10 per cent of the administered dose is excreted in 24 hours, but when there is deficiency of the intrinsic factor, usually less than 5 per cent is excreted in this time.

The efficiency of digestive processes and enzyme function may be studied by labelling proteins or fats with iodine and observing the activity in the feces and the rate of isotope accumulation in the blood. In this respect, pancreatic dysfunction (pancreatitis and pancreatic carcinoma) probably occurs most commonly in the dog, and $I^{131}$ labelled fat and protein *per os* would seem to offer a means of diagnosis.

These are only a few examples of the possible application of radioactive isotopes in clinical veterinary medicine. The advent of the atomic age has indeed brought great opportunities for a more intensive investigation of disease processes and provided new diagnostic tools for clinical medicine. "The human race has a great deal to gain both from the enormous potential increase in its energy sources and from the new tools which have been provided to the biologist. These new powers introduce new hazards. We must study and control these with all the power of the scientific method and so enable these benefits to be safely enjoyed."[9]

*Chlormerodrin (3-chloromercuri-2-methoxy-propylurea) used in this study was Neohydrin produced by Lakeside Laboratories, Milwaukee, Wis.

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## Veterinarians Assigned Role in Blastomycosis Diagnosis

A 52-year-old man died 5 or 6 weeks after the appearance of an inflammatory swelling of his knee. Treatment by aspiration, drainage, and antibiotics had been ineffectual. A mass was visible in early radiographs of the chest. Later radiographs showed multiple irregular densities scattered throughout both lung fields. Autopsy findings confirmed the diagnosis of North American blastomycosis. Similar history and findings were recorded on the case of a dog that had died 3 months earlier, and the circumstances suggest that the man may have contracted the disease from the dog. Microscopy showed the essential lesions in both the human and the canine patients to be granulomas and demonstrated the presence of *Blastomyces dermatitidis.*

It is imperative that, when physicians make a diagnosis of North American blastomycosis, they request veterinarians to perform the following procedures on associated pets and livestock: (1) complete physical examination, (2) radiographic examination of the chest, (3) culture of any cutaneous lesions for fungi, and (4) immunologic tests, including triple fungus skin tests and blastomycosis complement-fixation test.—*J.Am.M.A., 171, (1959): 2185.*

## Parenteral Iron Therapy May Induce Iron Toxicosis

Recent development of iron preparations that can be given intramuscularly has put parenteral iron therapy in the hands of all practitioners. It is important that the dangers, as well as the advantages, of these iron-dextran complexes be understood.

The body has no mechanisms for excretion of excess iron and normally depends upon regulation of iron absorption to avoid excessive storage. Consequently, to avoid possible iron toxicosis, the relatively concentrated intramuscular preparation should be used only when iron deficiency has been definitely established. It has been calculated that a normal adult who had no iron intake at all should not become deficient for over 5 years, since the body iron is re-utilized and there is no mechanism for its excretion.

In human infants, iron toxicosis leads to increased capillary permeability and fall in plasma volume, which may result in sudden cardiovascular collapse. The dose must be carefully calculated from the severity of the anemia.

Although intramuscular iron-dextran is much less toxic than previous intravenous preparations, animal experimentation and a few instances of untoward effects in man suggest that parenteral iron therapy should be reserved for those situations where oral therapy is not feasible.—*Borden Rev. Nutr., 20, (1959): 71.*

*Comparison of the Toxic Effects of*

*Crotalaria spectabilis* and *Crotalaria giant striata* as

# Complete* Feed Contaminants

Bert W. BIERER, V.M.D.
C. L. VICKERS, D.V.M.
W. H. RHODES, B.S.
John B. THOMAS, D.V.M.

OVER 600 SPECIES of Crotalaria have been reported from the various parts of the world. The plant exists in the Coastal Plains and other areas of the United States both as an objectionable weed and as a soil-building legume especially suited to light sandy soils. Once established, the plant appears to defy eradication.

In 1959, a survey[4] of the United States and its possessions revealed that Crotalaria is used as a cover crop in Oklahoma, Texas, Arkansas, Louisiana, Alabama, North Carolina, South Carolina, Georgia, Florida, and Hawaii. In Puerto Rico, it was formerly used in connection with fruit culture. While primarily a warm climate plant, workers in Oregon[16] report that early varieties may develop some bloom before autumn frosts.

Varieties commonly used in the southeastern United States are *Crotalaria spectabilis* and *Crotalaria giant striata* (mucronata). *Crotalaria spectabilis*, which appears to be the most highly toxic of all known varieties, was first introduced into Florida in 1921[21] by the U. S. Department of Agriculture as *Crotalaria sericea* under a foreign seed and plant introduction number.

Crotalaria poisoning in domestic animals can cause severe economic losses, because an animal once injured by the toxin of the plant usually will not respond to treatment.[8] The poisoning, sometimes referred to as "crotalism," is a strikingly insidious disease. For example, one group of workers[2] reported that 3 test animals that consumed 98 lb. of *C. spectabilis* hay during a 43-day palatability trial died of Crotalaria poisoning 10, 22, and 24 days, respectively, after the trial had been terminated. The toxin of *C. spectabilis*, an alkaloid named "monocrotaline," was isolated in 1935.[10]

Although numerous reports of Crotalaria poisoning have attributed it to various species of the plant,[1,3,5,9,11,17–20,23,24] it appears that workers at the Florida Agricultural Experiment Station during the 1930's were among the first to study Crotalaria poisoning by means of established experimental procedures. The investigation credited an acute disease in a flock of hens during 1931[21] to Crotalaria poisoning that resulted from the use of the cut mature plants as litter in the poultry house. *Crotalaria spectabilis* seeds were found in the crops and gizzards of dead birds. Feeding trials demonstrated that *C. spectabilis* seeds were toxic to chickens, quail, and doves, but only chickens would eat the seeds under natural conditions. These observations were confirmed in 1937,[7] and additional contributions were made relative to the pathology of the disease.

During 1933,[6] a disease of swine was investigated in which losses occurred in a field that contained *C. spectabilis*. The investigators found that ground seeds fed to hogs caused fatal results in most cases, but that whole seeds administered in a capsule passed undigested through the alimentary tract of the experimental animals. The pathologic changes seen in Crotalaria poisoning in swine, especially with reference to blood changes, were thoroughly investigated.

During 1931,[2] palatability studies of 11 species of Crotalaria were initiated. It had been reported that composition of early growth Crotalaria compared favorably with

From the office of the South Carolina Agricultural Experiment Station and the Clemson College Livestock Sanitary Department, Clemson, S.C. Technical contribution No. 323.

*"Complete" means a complete commercial ration designed as an adequate ration without supplementation.

other legumes and thus merited an investigation to determine possible use of Crotalaria as a livestock feed. In this study, *C. spectabilis* was shown to be toxic to cattle.

In 1946,[12] Crotalaria poisoning was studied in Louisiana. It was found that, while all portions of the plant contained the toxin, the principle "monocrotaline" was most highly concentrated in the seed.

Under experimental conditions conducted at the Florida Agricultural Experiment Station, *C. striata* was not found to be toxic and was considered to be a nontoxic variety.

In the following investigation of the problem of Crotalaria seeds contaminating ground, "complete" feeds were investigated. Work along these lines was initiated in 1959[13] when it was found that disease problems in a number of laying flocks in South Carolina appeared to be caused by the contamination of the ration with *C. spectabilis* seeds. During the same year, other workers[14,15,22] came to the conclusion that *C. spectabilis* contamination of commercial rations was evidently responsible for disease problems in a number of laying and broiler flocks in South Carolina and Georgia.

The present economic trend for poultry and livestock producers is to install a feed mill on their premises for private or local use. Local oats, corn, and other grains can conveniently be mixed and ground with a commercial concentrate containing vitamins, minerals, and other essential ingredients. These numerous private feed mills do not have the necessary equipment to properly screen or clean local grains. Therefore, it is extremely important that all small private mills, as well as the larger ones, be kept accurately informed about the possible toxic effects of poisonous seeds that may contaminate oats, corn, and other grains. Crotalaria seeds, as a voluntary growth following its use as a soil builder or as a weed, exists as a contaminant of seed corn when corn is harvested by a combine. The seeds can be removed at the feed mill by using a No. 14 (14/64-in.) round hole screen.[14]

Since *C. spectabilis* seeds were incriminated as a poisonous variety of Crotalaria by Florida workers and *C. striata* was con-

**TABLE 1 — Weight Gains, Feed Consumption, and Feed Conversion Indexes in Animals Fed Crotalaria Rations**

| No. animals per pen | Crotalaria (%) | Crotalaria variety | No. of weeks exposed | Av. body wt. or gain in lb. | Av. feed consumption in lb. | Feed conversion index |
|---|---|---|---|---|---|---|
| Chicks | | | | | | |
| 10 | 5.0 | Sp.** | | All dead by 10th day | | ..... |
| 10* | None | None | 4 | 0.73 | 2.37 | 3.24 |
| 10 | 1.0 | Sp. | | All dead by 19th day | | ..... |
| 10 | 0.1 | Sp. | 7 | 1.38 | 3.05 | 2.21 |
| 10 | 0.01 | Sp. | 7 | 2.05 | 5.00 | 2.43 |
| 10 | None | None | 7 | 2.21 | 6.00 | 2.71 |
| 10 | 5.0 | St.† | 4 | 0.28 | 1.71 | 6.10 |
| 10* | None | None | 4 | 0.73 | 2.37 | 3.24 |
| 10 | 1.0 | St. | 7 | 1.16 | 5.60 | 4.82 |
| 10 | 0.1 | St. | 7 | 2.20 | 5.50 | 2.50 |
| 10 | 0.01 | St. | 7 | 2.15 | 4.70 | 2.18 |
| 10 | None | None | 7 | 2.26 | 6.20 | 2.74 |
| Poults | | | | | | |
| 10 | 5.0 | Sp. | | All dead by 9th day | | ..... |
| 10 | 5.0 | St. | 4 | 0.67 | 1.61 | 2.40 |
| 10 | None | None | 4 | 0.87 | 2.06 | 2.36 |
| Swine | | | | | | |
| 2 | 5.0 | Sp. | 3 | No gain | 12.01 | ..... |
| 2 | 5.0 | St. | 8 | 96 | 263 | 2.73 |
| 1 | None | None | 8 | 112 | 323 | 2.88 |
| 2 | 1.0 | Sp. | 12 | 20 | 84 | 4.20 |
| 2 | 0.1 | Sp. | 12 | 107 | 322 | 3.01 |
| 1 | None | None | 12 | 122 | 356 | 2.91 |
| Sheep | | | | | | |
| 2 | 5.0 | Sp. | 5 | ..... | 105 | ..... |
| 2 | 5.0 | St. | 12 | ..... | 176 | ..... |
| 1 | None | None | 12 | ..... | 164 | ..... |
| Cattle | | | | | | |
| 1 | 5.0 | Sp. | | Died 38th day | 142 | ..... |
| 1 | 5.0 | St. | .... | ..... | 692 | ..... |
| 1 | None | None | .... | ..... | 685 | ..... |

*Same controls used for 5 per cent C. spectabilis and 5 per cent C. giant striata exposures. **Sp. refers to C. spectabilis; †St. refers to C. giant striata.

sidered a harmless variety, it appeared that one approach to solving Crotalaria poisoning problems was for agricultural extension workers to discourage use of *C. spectabilis* as a cover crop or soil builder and, at the same time, encourage use of harmless *C. giant striata*. Before this recommendation could be made, however, it was necessary to demonstrate conclusively that *C. giant striata* was harmless as a contaminant.

#### Materials and Methods

Supplies of *C. spectabilis* and *C. giant striata* seeds were obtained from commercial seed distributors. Identification was confirmed by state agricultural experts. Seeds were ground in a hammer mill on the experiment station premises and, when needed, added to a commercial chicken breeder ration in the desired concentration. The chicken breeder ration, uncontaminated, was used as the basal ration in all experimental units.

All feeds containing Crotalaria were mixed for 8 minutes. Feed containing a relatively high concentration of Crotalaria was used as a premix for the preparation of a lower amount of Crotalaria. For example, 10 lb. of 1 per cent Crotalaria feed was mixed with 90 lb. of basal ration in order to prepare a 0.1 per cent contaminated feed (tables 1, 2).

#### Results and Discussion

Results are summarized (tables 1 and 2). Ground *C. spectabilis* seed mixed in a complete ration resulted in mortality in chicks, turkey poults, swine, sheep, and cattle at a 5 per cent level of contamination.

After initial feedings, swine were reluctant to eat rations containing 5.0 per cent

**TABLE 2 — Mortality Rates and Necropsy Lesion Percentages in Test Animals Fed Crotalaria Rations**

| No. animals per pen | Crotalaria (%) | Crotalaria variety | No. of weeks exposed | Mortality per pen (%) | Gross lesions per pen: necropsy (%) |
|---|---|---|---|---|---|
| Chicks | | | | | |
| 10 | 5.0 | Sp.** | 1.4 | 100 | 100 |
| 10* | None | None | 4.0 | 0 | 0 |
| 10 | 1.0 | Sp. | 2.7 | 100 | 100 |
| 10 | 0.1 | Sp. | 7.0 | 20 | 100 |
| 10 | 0.01 | Sp. | 7.0 | 0 | 0 |
| 10 | None | None | 7.0 | 0 | 0 |
| 10 | 5.0 | St.† | 4.0 | 10 | 60 |
| 10* | None | None | 4.0 | 0 | 0 |
| 10 | 1.0 | St. | 7.0 | 0 | 50 |
| 10 | 0.1 | St. | 7.0 | 0 | 0 |
| 10 | 0.01 | St. | 7.0 | 0 | 0 |
| 10 | None | None | 7.0 | 0 | 0 |
| Poults | | | | | |
| 10 | 5.0 | Sp. | 1.2 | 100 | 100 |
| 10 | 5.0 | St. | 4.0 | 0 | 0 |
| 10 | None | None | 4.0 | 0 | 0 |
| Swine | | | | | |
| 2 | 5.0 | Sp. | 3.0 | 50 | 100 |
| 2 | 5.0 | St. | 8.0 | 0 | 0 |
| 1 | None | None | 8.0 | 0 | 0 |
| 2 | 1.0 | 1.0 | 12.0 | 0 | 100 |
| 2 | 0.1 | 0.1 | 12.0 | 0 | 0 |
| 1 | None | None | 12.0 | 0 | 0 |
| Sheep | | | | | |
| 2 | 5.0 | Sp. | 5.0 | 50 | 50 |
| 2 | 5.0 | St. | 12.0 | 0 | 0 |
| 1 | None | None | 12.0 | 0 | 0 |
| Cattle | | | | | |
| 1 | 5.0 | Sp. | 5.4 | 100 | 100 |
| 1 | 5.0 | St. | 12.0 | 0 | 0 |
| 1 | None | None | 12.0 | 0 | 0 |

*Same controls used for 5 per cent C. spectabilis and 5 per cent C. giant striata exposures. **Sp. refers to C. spectabilis. †St. refers to C. giant striata.

and 1.0 per cent *C. spectabilis* and became emaciated. Swine on a 0.1 per cent ration, however, readily consumed the ration for 90 days with no clinical evidence of distress or illness.

Ground *C. giant striata* seed mixed in a complete ration resulted in an interference in weight gains in chicks and turkey poults at a 5.0 per cent level but did not appear to be injurious to swine, sheep, or cattle under the conditions of the experiment.

Ground *C. spectabilis* seed mixed in a complete ration caused 100 per cent losses in chicks at the 1.0 per cent level and 20.0 per cent losses at the 0.1 per cent level. Of the birds on the 0.1 per cent level, 100 per cent showed gross lesions on necropsy after 7 weeks. Birds on a 0.01 per cent level weighed less than control birds on a normal ration.

Ground *C. giant striata* seed mixed in a complete ration severely stunted birds at a 1.0 per cent level and 50.0 per cent of these birds showed gross lesions when necropsied after 7 weeks of exposure.

The stunting effect of *C. giant striata* on chicks did not appear at the 0.1 per cent or 0.01 per cent levels during a similar feeding period.

Gross lesions of Crotalaria poisoning in chickens were a blotchy hepatitis, occasionally associated with hemorrhages of the heart and musculature. If the birds survived, the liver became shrunken and cirrhotic, and as much as 50 cc. of abdominal fluid accumulated in an 8-week-old bird. Histopathologic changes included congestion of sinusoids, vacuolation of hepatic cells, and fatty infiltration.

Sheep and swine that died from acute Crotalaria poisoning had extensive hemorrhages of the heart muscle grossly indistinguishable from bacterial infections characterized by toxemia. Some swine that survived the initial exposure were jaundiced and, on necropsy, had a cirrhotic liver, with thick bile in the gallbladder, resembling "yellow belly" or eperythrozoonosis. The histopathologic findings in swine livers were typical of a "hobnail" liver. Where exposure was light, jaundice was usually absent. The liver lesions and poor physical condition may lead one to erroneously conclude that "parasites" were the cause of the findings.

One yearling that died from Crotalaria poisoning showed jaundice, extensive heart hemorrhages, and a mottled "nutmeg" liver. The disease in the field could thus be confused with anaplasmosis or any of the bacterial infections characterized by toxemia.

## Summary and Conclusions

1) *Crotalaria spectabilis* may be highly toxic to livestock and may even interfere with growth in chickens at a level as low as 0.2 lb. per ton (0.01%).

2) Swine are reluctant to eat rations containing 5.0 per cent and 1.0 per cent ground *C. spectabilis* seeds but readily consume a ration at the 0.1 per cent level with no clinical evidence of illness.

3) Screenings of any kind containing *C. spectabilis* seeds or fragments should be destroyed and not be blended into livestock feeds.

4) *Crotalaria giant striata* appeared to be tolerated by swine, sheep, and cattle at 5 per cent levels but was injurious to poultry when the level exceeded 2 lb. per ton (0.1%).

5) Where use of Crotalaria as a soil builder is indicated, an agricultural extension worker should encourage the use of *C. giant striata.*

6) A No. 14 (14/64-in.) round hole screen will remove both species of Crotalaria seeds from contaminated grains.

7) With reference to poultry, the belief that *C. giant striata* is a harmless variety is erroneous.

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*An Early Report on*

# Crotalaria Poisoning

Bert W. BIERER, V.M.D.
John B. THOMAS, D.V.M.

WHAT appears to be the first report in the literature on Crotalaria poisoning was made by Dr. Millikan Stalker, state veterinary surgeon of Iowa, and the first dean and "grand old man" of Iowa State Veterinary College. Reference to this report appears to have escaped accurate detection and most of the credit has subsequently been given to C. E. Bessey, professor of botany at the University of Nebraska.

Stalker's report on "crotalism" in horses appears in the first annual report of the state veterinary surgeon, year ending June 30, 1885, pages 16 to 23. In this report he states that "I have invented the above term to designate a disease or a condition which I have found quite prevalent in certain parts of the State, and which to me at least, is a new or unrecorded one." This report evidently antedates other reliable descriptions of the disease by a quarter of a century.

It is commonly believed that Crotalaria species are confined to the southern states, yet Stalker's investigations revealed that the disease was present to an alarming degree in South Dakota, Nebraska, and Iowa for several years prior to 1885. He did point out, however, that in every instance the disease occurred in the Missouri River Valley in the states mentioned. Stalker found that a species of Crotalaria, *Crotalaria sagittalis*, used by farmers for forage was responsible for the losses. Identification of the plant was made by the botanist, C. E. Bessey, who deemed the matter of sufficient importance to describe the plant in detail in Stalker's report. Bessey refers to Stalker as "my colleague, Dr. M. Stalker," and the two, no doubt, worked on the problem in a cooperative manner.

Stalker's description of the disease and the gross lesions on necropsy remains unexcelled to the present day.

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From the State-Federal Livestock Disease Eradication Program, Columbia, S. C.

Acknowledgement is made of the assistance of Angelina J. Carabelli, Chief of Circulation and Photocopy Section, USDA Library, Washington, D. C.

*Holoacardius Entericus*

# A Bovine Fetal Monster

***Twin to a Normal Fetus***

James L. VOSS, D.V.M.
Glenwood P. EPLING, M.S., D.V.M.
Lloyd C. FAULKNER, D.V.M.

ON FEB. 23, 1959, the ambulatory clinic at Colorado State University was called to relieve dystocia in a 4-year-old Holstein-Friesian cow. Labor had reportedly progressed for 24 hours. The breeding history was not available.

Upon arrival at the farm, the clinician observed the muzzle and 1 forelimb of a normally developed fetus protruding from the vulva. The presentation was anterior longitudinal; the position was dorsosacral with the head and both of the forelimbs presented. The fetus was extremely dry and emphysematous and had been dead for 36 to 48 hours. The hair was beginning to slough. The viscera and tissue fluids of the fetus had been compressed to its pelvic and abdominal regions, thus causing an impaction of the abdominal and pelvic fetal parts at the pelvic inlet. The vulva of the cow was swollen, and all mucosae were cyanotic.

The dystocia was relieved with lubrication and traction. It was impossible to separate the placenta from the endometrium at this time. The uterus was extremely dilated and contained a large amount of fluid heavily stained with meconium. A stomach tube was introduced and a portion (6 to 8 gal.) of the fluids removed.

The following day, an attempt was made to remove the placenta. At this time, a large mass could be palpated near the junction of the body of the uterus and the nonpregnant horn. After separation of several of the cotyledons in this area, this mass was brought to the outside and found to be a fetal monster enclosed in its own separate amniotic sac. An attempt to remove the remainder of the membranes was unsuccessful.

On the third day, the cow appeared normal. Most of the fetal membranes were removed. Recovery was uncomplicated. The cow was anestrous in subsequent months and was sent to slaughter in June, 1959.


**Fig. 1—The bovine fetal monster: (A) intestine, (B) mesenteric mass, (C) umbilical area, (D) amniotic sac, and (E) chorionic tip.**

#### Gross Anatomical Findings

Twins, 1 anatomically normal (though born dead) and 1 a monster, shared a fused chorioallantois, but separate amni-

From the College of Veterinary Medicine, Colorado State University, Fort Collins, Colo.

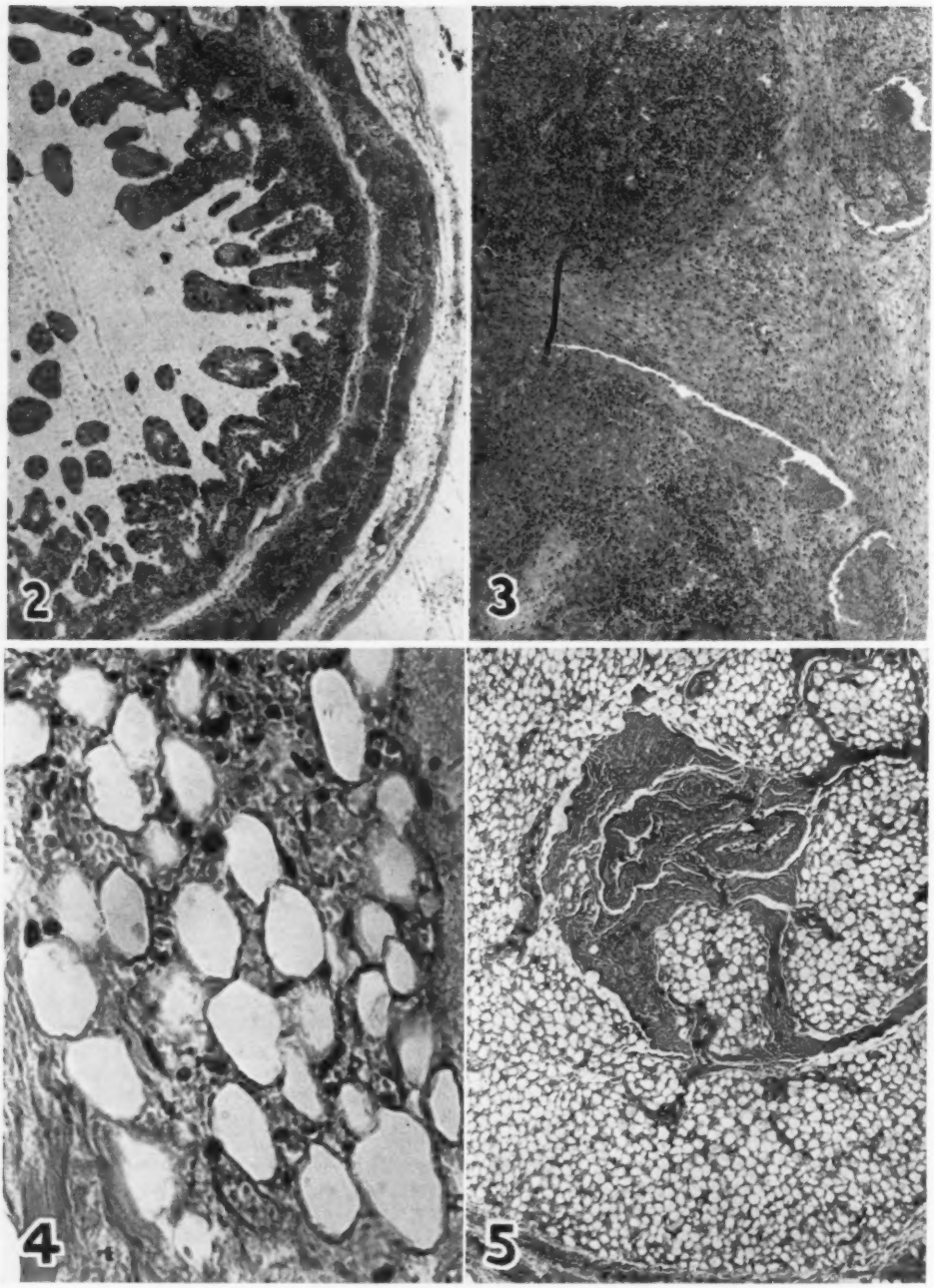


Fig. 2—Small intestine of the bovine fetal monster showing villi. x 48.

Fig. 3—Splenic tissue from mesenteric mass. x 48.

Fig. 4—Tissue resembling hematopoietic marrow, deficient in megakaryocytes (from mesenteric mass, figure 3). x 480.

Fig. 5—Adipose, dense irregular connective tissue, areolar connective tissue, vessels, and nerves. x 48.

otic sacs. The monster appeared at first to be simply a coil of intestines attached to a dense mesentery (fig. 1). The mass measured 15.5 by 9.0 cm.; it possessed an umbilical cord containing 1 large artery, 1 large vein, but no urachus. The general appearance of the intestinal mass resembled normal large intestine, with a blind-end diverticulum which appeared to be a cecum.

#### Histologic Findings

Histologic sections prepared by the paraffin method and stained with hematoxylin and eosin showed the following:

1) All the intestinal structures present possessed villi, indicating that they were segments of small intestine (fig. 2). Postmortem autolysis occurred to such a degree that the epithelial covering of the villi was almost entirely eroded. Otherwise, the structure was normal for small intestine.

2) The short mesentery possessed a central dense mass composed of a mixture of structures as follows: (*a*) diffusely scattered splenic structure (fig. 3); (*b*) material which resembled hematopoietic marrow deficient in megakaryocytes (fig. 4); (*c*) masses of adipose, dense irregular, and areolar connective tissue, which were richly innervated and vascular (fig. 5).

#### Summary of Anatomic Findings

The mass which appeared grossly as large intestine showed histologic structure characteristic of small intestine. Incompletely developed masses of spleen and red bone marrow-like material were scattered in the mesentery. Tissues present showed development from all 3 embryonic germ layers: (1) entoderm—intestinal epithelium (fig. 2); (2) mesoderm—connective tissue, smooth muscle, endothelium, blood cells, mesothelium; (3) ectoderm—nerve trunks containing axons and Schwann's cells (fig. 6), and amnionic epithelium.

No evidence of a neural tube, central

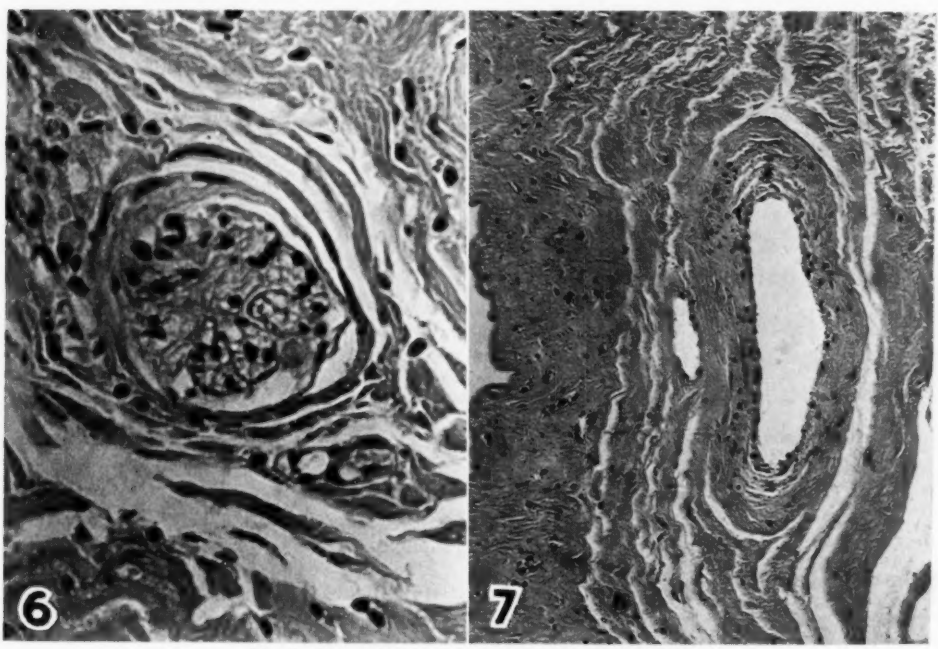


**Fig. 6—Nerve trunk of the bovine monster. x 480.**

**Fig. 7—Amnion, showing epithelium and a large vessel. x 120.**

nervous system, heart, body wall, bone, or skin was present.

Due to the fact that no identification for this monster could be found in the literature, a new term was coined to describe it. The term "holoacardius amorphus" refers to a shapeless monster without a heart. Because the principal mass present in the monster reported here was intestine, and because no heart was present, the name "holoacardius entericus" was thought descriptive.

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## Minimizing Staphylococcic Wound Infections

A study of wound infections in several thousand hernia operations in 2 private hospitals revealed that the most important sources of virulent staphylococci were the nasal passages of members of the operating room team, especially the surgeon or his immediate assistant, and the air in the operating room.

Specific recommendations in order to minimize dissemination of pathogens were: (1) more effective masking of operating room personnel, (2) general measures to keep operating room air as free of pathogens as possible, including use of ultraviolet radiation of the room for a few minutes between operations, (3) allowing operating room personnel to attend patients with discharging wounds only if attendants are efficiently masked, and (4) isolation of all patients with discharging wounds and careful clean-up when such rooms are vacated.

It was found that the patient's skin and his own nasal passages, the surgeon's hands or gloves, or the surgical instruments were highly unlikely sources of infection.—*J.Am.M.A., 170, (1959): 1274.*

## Polyarthritis in Sheep

An apparently new disease, polyarthritis of sheep, occurred in Wisconsin in the fall of 1957 and again in 1958. The incidence of the disease in feeder lambs was high, but mortality varied from 3 to 7 per cent. Lameness was a prominent sign. Increased respiration rate, fever, and loss of weight were also common.

Serous or fibrinous synovitis was a constant finding at necropsy. Small bodies, similar to the elementary bodies of viruses of the psittacosis-lymphogranuloma group, were seen in the synovial exudate and in reticuloendothelial cells in the spleen, lungs, and liver. An agent was recovered from the joints of naturally infected lambs and propagated serially in chicken embryos.

Experimental lambs inoculated with the chicken embryo-propagated agent developed a condition indistinguishable from the disease seen in the field.—[*B. Mendlowski and D. Segre: Polyarthritis in Sheep. I. Description of the Disease and Experimental Transmission. Am. J. Vet. Res., 21, (Jan., 1960): 68-73.*]

*Ligation of Blood Supply in Treatment of*

# Canine Prostatic Hyperplasia

*— a Case Report*

Harold KOPP, D.V.M.
Nell STOCKTON, D.V.M.

AN IRISH TERRIER, 14 years old, had been treated approximately 1 year for recurrent attacks of prostatitis with painful defecation. Examination by rectal and abdominal palpation had revealed a markedly enlarged prostate gland.

Except in those cases where the prostate gland was markedly enlarged, we had previously performed prostatectomies satisfactorily by using a method described in the literature. Due to the length of the prostatic urethra which was necessarily removed in these cases, the neck of the bladder and the pelvic urethra had been difficult to approximate.

Because of the dog's age and the size of the gland, the owner consented to an experimental surgical procedure of interruption of the blood supply to the prostate gland. It was considered that ligation of the blood supply might result in destruction of the gland without complications.

### Surgical Procedure

Preanaesthetic medication of morphine sulfate and atropine sulfate was given. Pentobarbital sodium was used for general anesthesia. Through a 6-inch midline abdominal incision extending from the pubis, the enlarged gland, approximately 6 cm. in length, was easily located. The blood vessels in this area were dissected and exposed, the urogenital arteries and the deferential ducts were identified, and the larger prostatic branches were individually doubly ligated and severed between the ligations. Smaller branches were incorporated in single ligatures. In this manner, practically all the blood supply to the prostate gland was interrupted. Care was taken to avoid incorporating in the ligatures the caudal vesical artery and smaller branches going to the bladder. The gland itself was then subjected to several individual ligatures in its cortical substance away from the prostatic urethra.

No immediate supportive therapy was given as the patient was in good postoperative condition and blood loss was minimal. Antibiotic and multiple vitamin therapy was given for 1 week postoperatively. Recovery was essentially uncomplicated except for sensitiveness on locomotion and defecation for about 5 days.

### Results and Discussion

For 2 months after recovery, the patient was observed to urinate and defecate normally. At that time, the owner requested that the dog be euthanatized for reasons unrelated to the surgery. At necropsy, the prostate gland was found markedly reduced in size to less than normal. The ligations had resulted in fibrosis of its parenchyma, and adhesions in the area were minimal.

This case report is offered with the belief that further experimental surgery of this type seems indicated for dogs that do not respond satisfactorily to medical treatment and for which, because of marked hypertrophy of the gland, prostatectomy seems undesirable.

The authors are small animal practitioners in Greenwich, Conn.

[1]Archibald, J., and Cawley, A. J.: Canine Prostatectomy. J.A.V.M.A., 128 (Feb. 15, 1956): 173-177.

*Pulmonary Arteriotomy for Removal of*

# Dirofilaria immitis

*in the Dog*

Howard S. WILCOX, D.V.M., M.S.

IN RECENT YEARS several important advances have been made toward clarifying the canine heartworm (*Dirofilaria immitis*) problem. The life cycle has been more clearly revealed, and diagnostic and chemotherapeutic methods have been improved. Surgical methods of treatment have been reported, but they have not been thoroughly explored. The purpose of this study was to evaluate the results of surgical removal of heartworms by arteriotomy of the pulmonary artery proximal to its bifurcation.

## Review of Literature

Surgical removal of canine heartworms was first reported in 1949.[7] The surgical approach for right ventriculotomy was through the right or left fourth or fifth intercostal space. Hemorrhage was controlled by either occlusion of the venae cavae, or by cross tension sutures placed in the edges of the ventricular incision. Similar cardiac surgery was reported during the next two years.[5,10] Successful removal of heartworms from branches of the pulmonary artery was reported in 1954,[14] 1955,[22] and 1958.[2,9]

In 1958, removal of heartworms by arteriotomy of the main trunk of the pulmonary artery was reported.[18] The approach was made from the left side through the fourth intercostal space. The venae cavae were occluded with umbilical tape suture. A Satinsky clamp was used to prevent pulmonary arterial hemorrhage while the artery was being incised prior to venae cavae occlusion, and while it was being sutured upon completion of the occlusion period.

In the aforementioned investigation,[18] 36 plumonary arteriotomies were performed on 30 dogs with 3 fatalities. Cause of death resulted from hemothorax in 2 dogs and from cerebral damage in 1. Number of heartworms removed from 21 known infected dogs varied from 4 to 57. Percentage of worms recovered surgically from 9 infected animals which were necropsied was 98.7. Marked clinical improvement was observed after surgical treatment.[17]

## Purpose of Investigation

Toxic reactions associated with heartworm therapy with trivalent antimonials[3,11,13,19,20,21] and the danger of massive emboli of adult worms following therapy with arsenicals[1,6,8,21] prompted several workers to investigate various methods of removing heartworms surgically. Until evaluation of the main pulmonary artery approach,[9,18] no one had reported the success of surgical technique as determined by clinical improvement and necropsy examination.

Unaware of this aforementioned evaluation,[18] the author felt that a critical evaluation of the main branch pulmonary arteriotomy should be undertaken because of its potential but unproved advantages over the previously reported techniques. It was the purpose of this investigation to evaluate this surgical procedure on the basis of survival rate and percentage of adult heartworms removed. Economic factors were considered in selection of equipment, surgical assistants, and supportive therapy so that this procedure could be used by the average practicing veterinarian.

This investigation was not considered to be a final evaluation, but a preliminary investigation, the results of which might warrant surgical treatment of selected clinical cases. It was felt that clinical data from the latter method of investigation coupled with the preliminary findings could be used as a basis for an accurate conclusion.

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This paper is based on a thesis submitted by the author to the Graduate School of the Alabama Polytechnic Institute in partial fulfillment of the requirements for the M.S. degree.

This work was done in cooperation with the K. A. Scott Canine Research Grant, Auburn Research Foundation, Alabama Polytechnic Institute, Auburn.

## Materials and Methods

A preliminary study utilizing 11 experimental dogs was undertaken for the purpose of developing the surgical technique to be used on dogs infected with heartworms. For surgical evaluation studies, 20 known infected dogs were used. Thorough preoperative physical examinations were performed. Postoperative care was limited to daily physical examinations for the first few days followed by brief observations the remainder of the three-week postoperative period. The dogs were then euthanatized and necropsies performed. Antimicrobial therapy was used only when definitely indicated, and animals were usually returned to outdoor runs two to five days following surgery.

The majority of the dogs were operated upon four to five hours after their last regularly scheduled feeding. The animals were anesthetized with pentobarbital sodium, and the left thorax was prepared for aseptic surgery. Oxygen was administered with a positive pressure respirator, and 5 per cent glucose in water was administered intravenously.

The skin was incised beginning at a point approximately 2 cm. above the posterior angle of the scapula and extending ventrally over the fourth intercostal space to within 2 to 3 cm. of the ventral midline. The incision was continued through the subcutaneous tissue and the cutaneous trunci, latissimus dorsi, superficial pectoral, serratus ventralis, and intercostal muscles. The parietal pleura was carefully penetrated with scissors and cut the full length of the incision. The ribs were then spread with a self-retaining rib retractor.

The lung was retracted dorsally, and the mediastinum was penetrated with scissors at a point approximately 1 to 2 cm. below the phrenic nerve and just anterior to the junction of the pericardium and anterior mediastinum. The mediastinal opening was enlarged digitally. An 18-inch length of 1/8-inch wide umbilical tape suture was passed around the anterior vena cava and the free ends were passed through a 3- to 4-inch section of 3/16-inch rubber tubing. The posterior vena cava was similarly exposed and prepared for occlusion.

Although the procedure was not considered routinely necessary, nor even desirable,[4] the vena azygos was prepared for occlusion in 4 dogs, 3 of which were in the preliminary study. This vessel was reached by penetrating the mediastinum anterodorsally to the aortic arch. Umbilical tape was similarly passed around it and through rubber tubing.

The pericardium was incised parallel to and approximately 1 cm. ventral to the phrenic nerve. The incision was extended to the anterior and posterior extremities of the sac, and in some instances the sac was incised ventrally from this horizontal incision to form a "T"-shaped incision. The dorsal margin of the pericardial incision was then retracted dorsally and held in place with a stay suture through the thoracic musculature at the dorsal extremity of the thoracic incision. The cardiac lobe of the lung was covered with saline solution moistened gauze sponges and was conveniently retained behind the stay suture. The main trunk of the pulmonary artery was then satisfactorily exposed.

The venous flow through the posterior vena cava was interrupted by applying tension to the ends of the umbilical tape and forcing the rubber tubing against the vessel. This tension was maintained by applying hemostatic forceps on the umbilical tape at the distal end of the rubber tubing.

**TABLE 1—Effectiveness of Surgical Removal of Heartworms***

| Dog (No.) | Age** (yr.) | Total No worms | Worms removed surgically (No.) | Worms removed surgically (%) | Worms removed at necropsy |
|---|---|---|---|---|---|
| 129 | 10 | 11 | 9 | 81.8 | 2 |
| 123 | 7 | 20 | 17 | 85.0 | 3 |
| 142 | 5 | 19 | 19 | 100.0 | 0 |
| 138 | 10 | 37 | 28 | 75.7 | 9 |
| 126 | 6 | 6 | 5 | 83.3 | 1 |
| 148 | 4 | 54 | 50 | 92.6 | 4 |
| 140 | 10 | 28 | 28 | 100.0 | 0 |
| 153 | 5 | 4 | 3 | 75.0 | 1 |
| 169 | 4 | 19 | 19 | 100.0 | 0 |
| 157 | 1 | 67 | 61 | 91.1 | 6 |
| 176 | 10 | 52 | 47 | 90.4 | 5 |
| 165 | 4 | 24 | 24 | 100.0 | 0 |
| 185 | 10 | 4 | 4 | 100.0 | 0 |
| 174 | 4 | 40 | 40 | 100.0 | 0 |
| 149 | 4 | 9 | 7 | 77.8 | 2 |
| 183 | 2 | 11 | 9 | 81.8 | 2 |
| 167 | 2 | 66 | 62 | 93.9 | 4 |
| 162 | 4 | 29 | 24 | 82.8 | 5 |
| 143 | 4 | 12 | 10 | 83.3 | 2 |
| 180 | 2 | 6 | 6 | 100.0 | 0 |
| Total | | 518 | 472 | 91.1 | 46 |

*These data are arranged in the chronological order in which the dogs were operated.

**Age was estimated by the condition of the animals' teeth.[15]

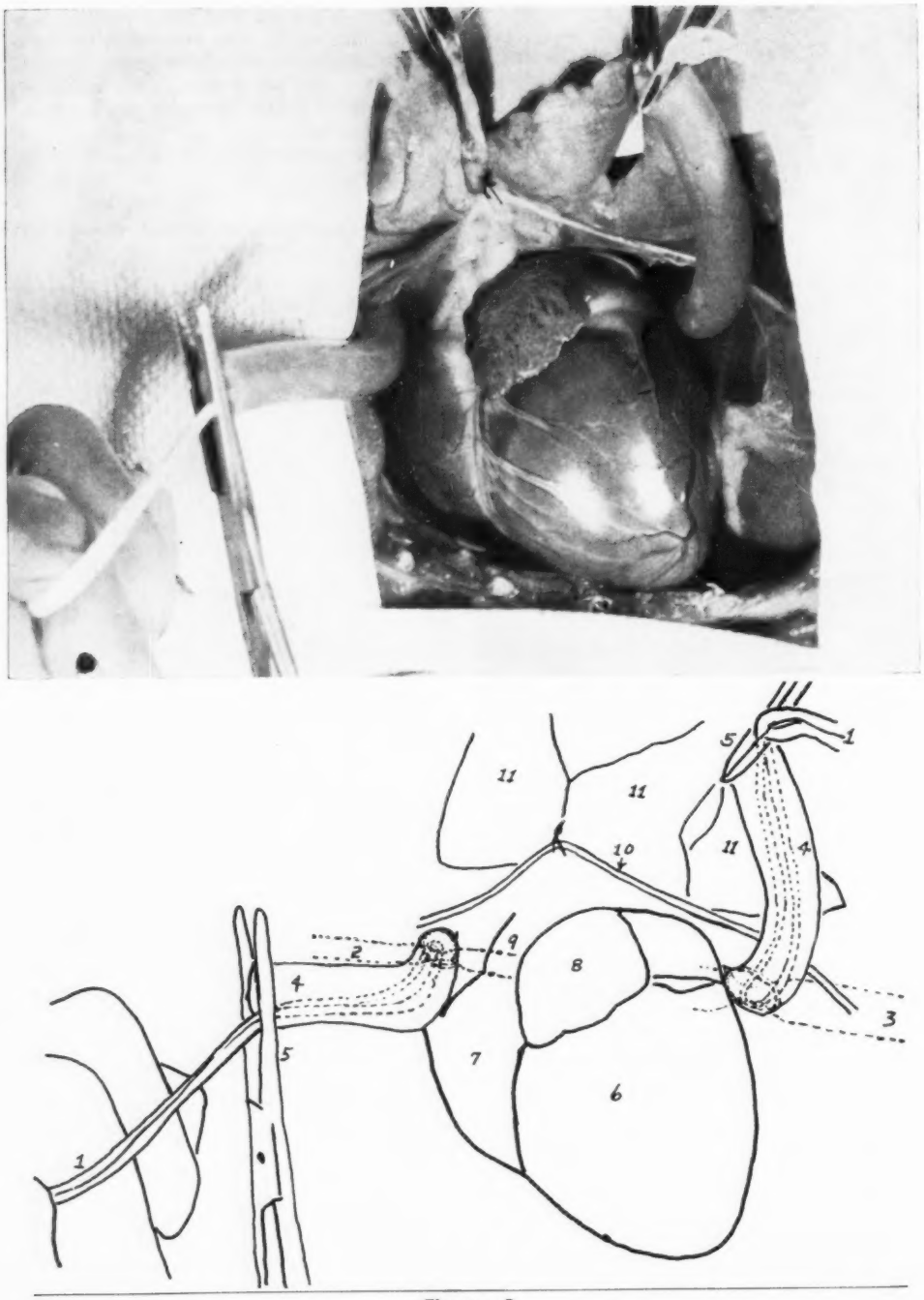


**Figure 1**

**TABLE 2—Surgical Data—Heartworm-Infected Dogs**

| Dog (No.) | Occlusion time[a] (min.: sec.) | Cardiac emptying period[b] (sec.) | Blood loss per dog (cc.) | Blood loss dog per lb. (cc.) | i.v. fluid therapy per dog (cc.) total | i.v. fluid therapy per dog (cc.) per lb. | Cardiac rhythm |
|---|---|---|---|---|---|---|---|
| 129 | 4:00 | 40 | 312 | 10.76 | 500 | 17.25 | Bradycardia |
| 123 | 4:00 | NR[c] | 150 | 6.66 | 250 | 11.11 | Ventricular fibrillation |
| 142 | 3:30 | 20 | 229 | 9.75 | 250 | 10.63 | Bradycardia |
| 138 | 3:00 | 20 | 103 | 5.72 | 250 | 13.89 | Bradycardia |
| 126 | 3:00 | 20 | 182 | 12.12 | 250 | 16.68 | Bradycardia |
| 148 | 3.00 | 20 | 196 | 6.43 | 360 | 11.80 | Bradycardia |
| 140 | 3:30 | 20 | 249 | 7.32 | 450 | 13.22 | Atrial fibrillation |
| 153 | 3:10[d] | 30 | 210 | 4.72 | 400[e] | 8.98 | Ventricular fibrillation |
| 169 | 2:25 | 30 | 359 | 10.71 | 400 | 11.94 | Normal |
| 157 | 3:15 | 30 | 160 | 4.57 | 500 | 14.29 | Bradycardia |
| 176 | 3:05 | 30 | 389 | 10.23 | 500 | 13.17 | Normal |
| 165 | 2:35 | 30 | 315 | 7.87 | 400 | 10.00 | Bradycardia |
| 185 | 3:15 | 30 | 156 | 8.00 | 400 | 20.50 | Asystole |
| 174 | 2:30 | 30 | 156 | 4.87 | 500 | 15.62 | Bradycardia |
| 149 | 2:50 | 30 | 186 | 6.64 | 250 | 8.94 | Normal |
| 183 | 3:25 | 30 | 169 | 9.39 | 350[f] | 19.44 | Normal |
| 167 | 3:00 | 30 | 185 | 8.22 | 300 | 13.33 | Normal |
| 162 | 3:00 | 30 | 298 | 16.57 | 400 | 22.23 | Bradycardia |
| 143 | 2:30 | 30 | 141 | 4.14 | 400 | 11.78 | Normal |
| 180 | 3:30 | 30 | 213 | 9.69 | 350 | 15.91 | Normal |
| Mean | 3:08 | ..... | ..... | 8.22 | ..... | 14.04 | ..... |

[a]Occlusion time — the period during which both venae cavae were occluded. [b]Cardiac emptying period — time between the occlusion of the venae cavae and incision in the pulmonary artery. [c]NR — not recorded. [d]Vena azygos also occluded. [e]Included 100 cc. of Levophed Bitartrate* solution. [f]Included 50 cc. of Levophed Bitartrate* solution.

*Levophed Bitartrate is the trade name of Levarterenol Bitartrate, U.S.P., Winthrop Labs., Inc., New York, N.Y.

Five per cent glucose in water or in isotonic saline was used as the diluent and each cc. contained 4μg. of the base.

The anterior vena cava was similarly occluded (fig. 1). Time of occlusion was accurately recorded.

Thirty seconds after occluding the anterior vena cava, the pulmonary artery was grasped with rat-tooth thumb forceps, and a stab incision was made with a scalpel equipped with a No. 11 Bard Parker blade. As the scalpel was withdrawn with the cutting edge directed dorsally, the incision was lengthened to approximately 1.5 to 2.0 cm. (fig. 2). Allis tissue forceps were then applied to each side of the incision so that the assistant could open and close the incision as conditions indicated. An aspirator was held in the surgeon's left hand, and inserted into the artery directed toward the right ventricle. Curved Carmalt forceps were used with the right hand to remove the heartworms as they appeared in the incision and later to explore the major pulmonary branches and the right ventricle (fig. 3).

When no more heartworms were readily found, the incision was sutured with No. 4-0 cardiovascular silk with a swedged atraumatic needle (fig. 4). Suture tension was maintained by an assistant by applying traction to the free end rather than by tying. Allis tissue forceps were removed

## Legend for Figure 1 on Opposite Page

**Fig. 1—Occlusion of the venae cavae. Venous return through the venae cavae was interrupted by passing umbilical tape suture around each vessel near the heart, threading the free ends through rubber tubing, and forcing the tubing down against the vessel. This pressure was maintained by forceps which are shown being clamped onto the suture at the outer end of the tubing. Several ribs have been removed to facilitate this view.**

**(1) Umbilical tape suture; (2) anterior vena cava; (3) posterior vena cava; (4) rubber tubing; (5) hemostatic forceps; (6) left ventricle; (7) right ventricle; (8) left auricle; (9) pulmonary artery; (10) phrenic nerve; (11) lung.**

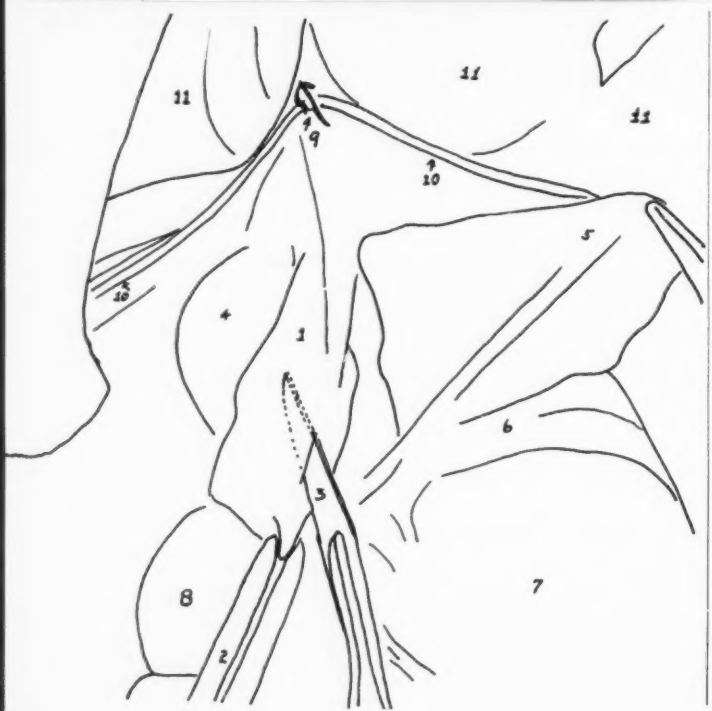


**Fig. 2—Incising the pulmonary artery. The pulmonary artery was grasped with thumb forceps immediately distal to the pulmonary valves and incised with a scalpel and No. 11 Bard Parker blade. A stab incision is shown being made, which is followed by elongation of the incision as the blade is withdrawn.**

**(1) Pulmonary artery; (2) thumb forceps; (3) scalpel blade; (4) aorta; (5) left auricle; (6) coronary groove; (7) left ventricle; (8) right ventricle; (9) stay suture to retain the pericardium; (10) phrenic nerve; (11) lung.**

as they were encountered. Upon completion of the first suture row, tension was maintained on both ends of the suture, and the venous flow immediately re-established by releasing the forceps which were maintaining the umbilical tape tension on the venae cavae. Time was again recorded. Intravenous fluid rate was increased to 70 to 100 drops per minute. As the heart filled, it gradually resumed its normal rhythm and force. The suture line was then strengthened by continuing the simple continuous suture back over the first row. The free ends were tied at the distal end of the suture line. The pericardial stay suture and lung packs were removed, and the lungs fully inflated by increasing oxygen pressure.

When pronounced cardiac arrhythmia occurred, the second arterial suture line was completed prior to instituting resuscitative measures. This was necessary, because the suture line was not tied until completion of the returning row after which a single tie was made. After the second occurrence of ventricular fibrillation, preparations for cardiac resuscitative procedures were incorporated into the routine surgical preparation.

The thoracic cavity was sponged free of obvious accumulations of blood and in most instances was irrigated with isotonic saline solution. The pericardium was not sutured in any of the infected animals. The pleura and intercostal muscles were sutured as a single layer by the use of either an interrupted horizontal mattress or a simple continuous pattern. These pleura-intercostal muscle sutures were usually inserted but not tied before applying tension sutures around the fourth and fifth ribs. The tension sutures consisted of either ⅛-inch umbilical tape or 28-gauge monofilament stainless steel wire. Two or 3 were required to approximate the ribs. The thoracic muscles were closed by layers with a simple continuous suture of No. 2-0 or 3-0 medium chromic catgut reinforced with several simple interrupted sutures. Interrupted vertical or horizontal mattress sutures were used to approximate the skin. Aspiration of the pleural cavity following chest closure was required in only 1 animal in the infected group. Proper inflation of the lungs during closure of the thorax ordinarily eliminates this time-consuming task.

Blood transfusions and prophylactic use of antimicrobial agents were purposely avoided. Oxygen consumption and blood loss were recorded. Blood loss was estimated by measuring the amount aspirated and by weighing bloody sponges and calculating their increase in weight over an equal number of dry sponges.

### Results

Number and percentage of heartworms surgically removed from each animal are tabulated (table 1). Two dogs died as a result of surgery. Although both deaths occurred in heartworm-infected dogs, the condition of both the noninfected group used for the preliminary study and the infected group were clinically the same; therefore both groups were considered together. Thirty-one animals were operated upon with 2 deaths—a survival rate of 93.2 per cent. Both deaths were attributed to ventricular fibrillation.

Surgical data pertaining to the heartworm-infected group were recorded (table 2). Cardiac rhythm was recorded during the occlusion period and for a few minutes following renewed venous flow. The rhythm in 7 animals was considered essentially normal. In 9 dogs, bradycardia occurred but was limited to 3 minutes after the end of the occlusion period. Momentary atrial fibrillation occurred in 1 dog at the end of the occlusion period. Asystole also occurred in 1 dog after two minutes and 30 seconds of occlusion and persisted for approximately one minute. The first weak contractions occurred approximately 15 seconds after venous flow was renewed. One minute later, the rhythm and force were approximately normal. Ventricular fibrillation occurred in 2 dogs. Resuscitative procedures failed to permanently alleviate this arrhythmia in 1 dog. In the second dog, normal rhythm was obtained after approximately 30 minutes; however, the dog did not regain consciousness and died two days later. Failure in both instances was attributed to inadequate cardiac massage and delay in performing defibrillation by electrical shock.

Changes in body weight during the immediate surgical period and during the three-week postsurgical period varied greatly, but the mean changes were approximately zero. The body temperatures were elevated approximately 1 degree on the morning following surgery but in most

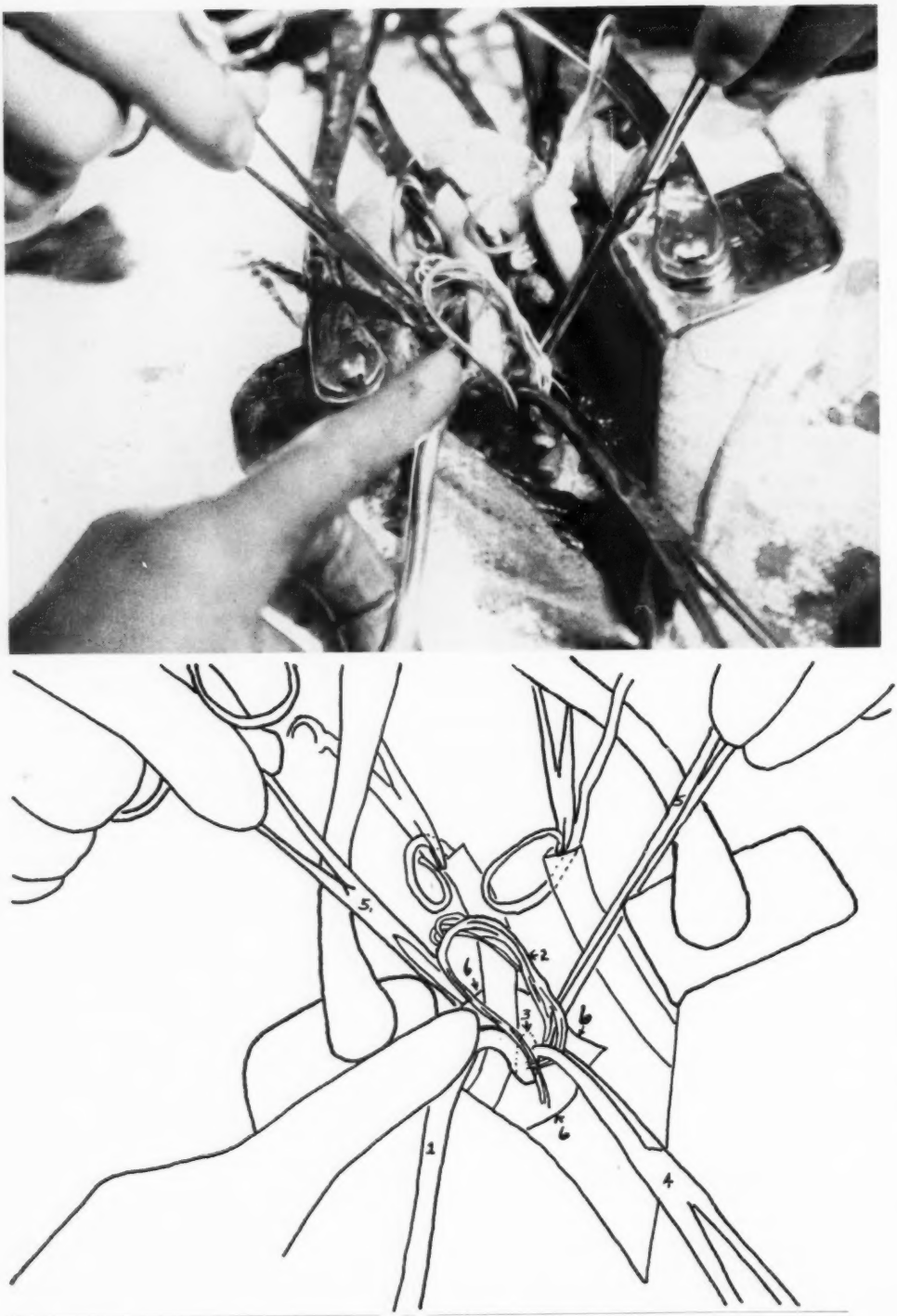


Figure 3

instances returned to approximately normal by the second morning. Similarly, pulse rates were moderately elevated on the first postoperative day but approached normal on the second day.

Complicating disease conditions other than those attributable to surgery were experienced in 8 dogs. Of these, distemper was clinically diagnosed in 3, clinical hookworm infection in 2, a traumatic vertebral lesion in 1, and metritis in 1 dog. Infections associated with surgery were suspected in 2 animals. One other dog had an elevated temperature before and after surgery, but the cause was not determined.

A comparison of the presurgical and 21st-day postsurgical hematologic values of 3 dogs revealed no particular trend. Leukocytosis, neutrophilia, and eosinophilia were common, and sedimentation rates were substantially elevated.

The primary lesions related to surgical procedures were pleural adhesions to the thoracic incision and pericardial adhesions to the epicardium. Only 1 of the 18 animals surviving the three-week recovery period was free of pleural adhesions. Epicardial adhesions occurred in 7 dogs. There were no thrombi attached to the arterial incisions; however, 1 animal had two small thrombi (2 mm.) on the opposite side of the lumen. Two dogs developed fibrous enlargements on the ribs about the rib tension sutures, one occurring with wire and one with umbilical tape sutures.

The primary necropsy lesion attributed to heartworm infection was pulmonary endarteritis. Easily visible intimal proliferations were observed in 15 of 20 heartworm-infected dogs. The region of the pulmonary tree involved varied in the degree in which it was affected. Generally the extremities were most severely affected.

An attempt was made to determine the location of the adult heartworms as they were extracted surgically from the main trunk of the pulmonary artery. In 12 dogs, the pulmonary artery was clamped at the pulmonary valve prior to euthanasia. Twenty-seven heartworms were recovered from the pulmonary artery of 6 of these dogs and none were recovered from the heart.

## Discussion

Surgical treatment of heartworm infection cannot be properly implemented until better diagnostic methods are developed. The usefulness of contrast angiocardiography in estimating the adult population has been reported.[9,17] At this time, however, clinical sympotomatology remains the most commonly accepted criterion.

Thus far, the investigations of the effectiveness of surgical treatment, including this study, have been based on the percentage of heartworms removed as revealed by necropsy. Furthermore, the patients have been only lightly or moderately infected and, except for brief mention of clinical improvement,[17] no clinical evaluation has been presented.

The incidence of ventricular fibrillation was 6.5 per cent, and it is considered to be sufficiently high to warrant preparations which would enable immediate implementation of cardiac resuscitative measures. It is also suggested that preventive measures should be incorporated, such as presurgical injections of procaine or procainamide.

The vena azygos was occluded in addition to the venae cavae in four operations, one of which terminated fatally due to ventricular fibrillation. Experimental evidence has been reported[4] which suggested that it was advantageous not to interrupt the blood flow through the vena azygos. In

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**Legend for Figure 3 on Opposite Page**

**Fig. 3—Removal of heartworms through the incision in the pulmonary artery. The tip of the aspirator, held in the surgeon's left hand, is in the proximal end of the arteriotomy incision and is directed ventrally toward the ventricle. Heartworms are being removed from the pulmonary artery with Carmalt forceps held in the surgeon's right hand. The assistant is holding the incision open with Allis tissue forceps applied to each side of the arterial incision. (1) Aspirator; (2) heartworms; (3) incision in the pulmonary artery; (4) carmalt forceps; (5) Allis tissue forceps; (6) incised edge of the pericardium.**

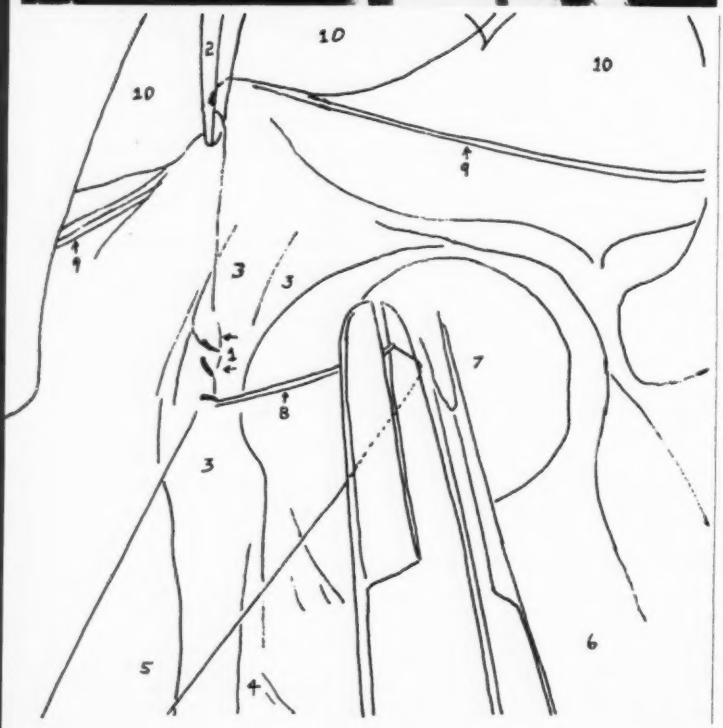


**Fig. 4—Closure of the arterial incision. A continuous suture was used to close the arterial incision. The assistant held tension on the free end (upper forceps) while the surgeon completed the suture line. (1) First suture row in pulmonary artery; (2) assistant's forceps; (3) pulmonary artery; (4) left longitudinal groove; (5) right ventricle; (6) left ventricle; (7) left auricle; (8) suture needle; (9) phrenic nerve; (10) lung.**

the author's investigation, blood losses were not recorded on a sufficient number of animals in which the vena azygos was occluded to compare the blood losses by the two methods. It would appear that increased incidence of ventricular fibrillation and cerebral or cardiac anoxia due to vena azygos occlusion would be of much greater consequence than the increased blood loss resulting from patency of the vena azygos.

The location of adult heartworms under the conditions of these surgical and necropsy techniques suggests that their normal habitat may be the pulmonary artery. This is in contrast to the previously reported findings[16] under slightly different conditions which state that the normal habitat is the right ventricle. The natural location of the heartworm is of more than academic interest. A definite conclusion about the normal habitat of the heartworm could possibly aid investigations of the pathogenesis of this disease. Also, the knowledge of the location of the adults as well as conditions affecting their migration may be of value in improving the technique of surgical removal of heartworms.

The author is cognizant of the fact that this work was done on a limited number of animals under experimental conditions, and that these dogs had only light infections at the time that necropsy was performed. However, it is felt that these data support the concept that the pulmonary artery is the natural habitat as conclusively as the previous evidence supports the accepted theory that the location is primarily in the right ventricle.


#### Summary

Heartworms (*Dirofilaria immitis*) were surgically removed from 20 dogs by means of a main trunk pulmonary arteriotomy. The thoracotomy was made through the fourth left intercostal space and the major venous return to the heart was interrupted for 2.5 to 4.0 minutes by vanae cavae occlusions. During this interval, the pulmonary artery was incised, the heartworms removed, and the incision sutured. Two fatalities resulted, and both were attributed to ventricular fibrillation.

Recovery from surgery was satisfactory, but no clinical evaluation of the effect of heartworm removal was attempted. Necropsy after a recovery period of three weeks revealed the mean percentage of worms surgically removed to be 91.1. The maximum number of heartworms removed from 1 dog was 62 and the maximum number remaining at necropsy was 9.

The habitat of the heartworms under the conditions of surgery was found to be primarily the pulmonary artery. At necropsy, all of the remaining worms were found in the pulmonary artery in those animals in which the pulmonary artery was clamped close to the heart prior to death. In contrast, the remaining worms were primarily located in the heart in those animals in which the patency of the pulmonary artery was not disturbed prior to euthanasia. Although no definite conclusion is justified, evidence is presented which suggests that the primary location of the adult heartworm is in the pulmonary artery rather than the right ventricle.

This surgical procedure is both sufficiently safe and effective in dogs lightly to moderately infected with heartworms to warrant its use in selected clinical cases which are deemed poor risks for chemotherapy.


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## *Quiz for Quidnuncs*

1. A veterinarian fails to advise a client to withhold milk from market for 72 hours from a cow he treated with penicillin (by any route). The milk is not withheld for 72 hours and is shipped interstate. Has the veterinarian violated a federal statute? Page 296.

2. Using one of the newer tests, how long does it take to determine presence of antibiotics in milk? Page 299.

3. What agents have been used to treat intestinal gaseous distension in man as a result of their successful use in treating cattle bloat? Page 305.

4. What are the possible applications of radioactive isotopes in veterinary medicine? Page 313.

5. Why is parenteral iron therapy more dangerous than oral iron therapy? Page 317.

6. How successful is ligation of the blood supply to the prostate as a treatment for prostatic hyperplasia in the dog? Page 327.

7. What role does the horse play in transmission of eastern viral (equine) encephalomyelitis to man? Page 339.

# Editorial

## Eastern Viral Encephalomyelitis

Guest Editorial

During the past summer, there occurred an epizootic of eastern viral encephalomyelitis (EVE) in southern New Jersey, during which the virus bared its fangs and showed its potentiality for causing illness, death, consternation, and hysteria. It killed birds, horses, and man.

### Wild Birds Play Important Role

It seems established that birds are the most common vertebrate host of the virus and that mosquitoes are the most prominent vectors. However, the ecologic factors, even those involving birds and mosquitoes, that are conducive to the transfer of virus are understood only in the most general terms. We know, for instance, that a number of the smaller birds, such as the red-winged blackbird, sparrow, and cardinal, are susceptible to the virus and may develop a high viremia before death. Other birds, such as the egret, ibis, and some of the herons, do not become clinically ill as a result of infection and do not circulate virus in their blood streams in high titer.

From an epidemiologic standpoint, we know that the titer of virus in the blood of the host is important in determining whether this host can serve as a source of infection for mosquitoes. We also know that different species of mosquitoes vary tremendously in their infection threshold, infection rate, and transmission rate. For instance, some species of mosquitoes cannot become infected unless they feed upon blood containing relatively large amounts of virus; others, even though they themselves become infected, prove incapable of transmitting virus to vertebrate hosts. Still other species can ingest tremendous amounts of virus without becoming infected. In addition, many species of mosquitoes are relatively selective in the range of hosts upon which they feed. Thus, a predominantly bird feeder, even though heavily infected, would be of little potential hazard to mammals. We know that the mere finding of virus in a wild blood-sucking arthropod, though of interest, actually tells us only that the virus has been present in the blood stream of some host upon which this arthropod has fed. It does not necessarily incriminate the arthropod as a transmitter of the disease.

### Infected Horses Not Hazardous to Man

We know that horses infected with EVE have the virus in their blood for a short period of time early in the disease. However, the titer of this virus is ordinarily too low to serve as a source of infection for most mosquitoes that feed upon horses. It seems likely, therefore, that the horse is not a significant factor in the maintenance of EVE in nature and is probably actually a dead-end so far as virus transmission is concerned.

There are a number of regions in our country in which EVE seriously involves the horse population without ever making its appearance in the human population. However, when both horses and man are involved, the equine cases ordinarily precede the human cases by about 2 weeks. The significance of this sequence of events is not well understood.

### Virus Perpetuated in Arthropod Vectors

We know that mosquitoes, once having acquired EVE infection, maintain it throughout the whole of their life span. This suggests the possibility that at least part of the mechanism for perpetuation of the virus from one season to the next may be through infected mosquitoes that overwinter by hibernation. We also know that mosquitoes are not the only vectors capable of transmitting the virus. Mites and certain other ectoparasites can also transmit it and may conceivably play a role in the natural history of the disease.

#### Epidemiology Not Well Understood

The knowledge that we most woefully lack concerning the epidemiology of EVE is an understanding of those factors which are responsible for the intermittent spilling of virus into its 2 chief mammalian hosts—horses and man. What the fortuitous ecologic combinations are that account for the periodic occurrence in these 2 hosts are still completely mysterious. Furthermore, there is no explanation of why horses are occasionally infected without man being involved, or why, when both hosts are infected, the horse usually precedes man by about 2 weeks.

#### Effective Control Possible

Despite the wide gaps in our knowledge concerning the epidemiology of EVE, there are still many control measures that can be put into effect. Probably the most important one is the matter of early recognition of the true nature of this disease when it occurs. Given material from an infected bird, horse, or man, no more than 72 hours should be required for a laboratory to make a positive diagnosis of EVE.

Once the diagnosis of the presence of the disease in an area has been established, control measures may be directed against its presumed main vector, the mosquito. The economically important susceptible animals in the area—pheasants and horses—can be adequately protected by vaccination; there seems little excuse, in the present state of our knowledge, for widespread losses among either of these species.

The things that remain to be studied before we find ourselves in a position to handle EVE completely and intelligently are almost overwhelming and much good field work will be required in order to solve the mystery of why man is occasionally attacked. It would be helpful, also, if we knew the infection threshold, infection rate, and the transmission rate for the mosquitoes that prevail in areas where horse and man are periodically victims of EVE.

#### Name Change Proposed

Since the best scientific evidence available indicates that the horse is probably not a factor in the spread or maintenance of EVE in a region, it is important and even urgent to remove, by public education, the stigma from the horse as a danger to public health. A step in this direction would be taken if the designation, "eastern viral encephalomyelitis," could be substituted for the one that has been in common usage since the early 1930's—eastern equine encephalomyelitis (EEE). Actually, the older and now well-established name is, in the light of our present knowledge, something of a misnomer. Perhaps even a better designation than either EVE or EEE might be to call the disease "eastern encephalitis" (EE) as has been suggested by several investigators who have worked with the virus in recent years.—*R. E. Shope, M.D., Rockefeller Institute, New York, N.Y.*

## Symposium on Eastern Viral Encephalomyelitis

A symposium on eastern viral encephalomyelitis, held in Philadelphia on Jan. 8, 1960, was arranged by the School of Veterinary Medicine of the University of Pennsylvania in the hope that discussion of the disease by a group of people having authoritative knowledge concerning it would at least summarize what we know about its natural history and might yield information of value in coping more effectively with it in the future.

The participants in the symposium were Drs. Roscoe P. Kandle, commissioner of health of New Jersey; R. S. Chamberlain, entomologist from the Communicable Disease Center; Jordi Casals of the Rockefeller Foundation; Martin Kaplan of the World Health Organization; and R. R. Marshak of the University of Pennsylvania School of Veterinary Medicine. Dr. R. E. Shope of the Rockefeller Institute, author of the preceding editorial was chairman.

From the five presentations and the discussions which followed each of them, there emerged a good deal of information, some speculation, and a considerable feeling that there is much about the natural history of this disease, especially as concerns its appearance in man and the horse, about which we are as yet completely ignorant.

# from the Research Journal

## Causative Virus of Polyarthritis in Sheep

The virus of sheep arthritis seems to be related to the psittacosis-lymphogranuloma group. Similarities with viruses of this group include the presence of elementary bodies, relative sensitivity to terramycin and penicillin but not to streptomycin, pathogenicity for chicken embryos and guinea pigs and, more important, cross reaction of sheep arthritis serums with ornithosis complement-fixing antigen.

Some differences were observed, notably the resistance of mice to experimental infection and destruction of the complement-fixing antigen by phenol.

More information is needed to form a decision as to whether sheep arthritis is caused by a new virus of the psittacosis-lymphogranuloma group, or whether it is a hitherto undescribed manifestation of an already known virus.—[*B. Mendlowski, William H. Draybill, and D. Segre: Polyarthritis in Sheep. II. Characterization of the Causative Virus. Am. J. Vet. Res., 21, (Jan., 1960): 74-80.*]

## Ovarian Activity in Sheep

Ten yearling western-type ewes were maintained under normal environmental conditions in an open shed from April 10 to July 24. Three of these ewes exhibited 1 or 2 estrous periods but none showed evidences of ovulation or corpus luteum formation when the ovaries were examined at laparotomy in July. Of 20 ewes exposed to reduced amounts of natural light by confinement in a darkened room during a part of the 24-hour cycle, 13 came in heat and were bred, but only 2 produced lambs. A reduction of the light period to 11 hours of natural light, with 13 hours of complete darkness per day, beginning on April 10, increased the incidence of estrus and induced ovulation, but fertility remained low.—[*T. M. Means, F. N. Andrews, J. F. Bullard, and W. E. Fontaine: The Effects of Light and Temperature on Ovarian Activity in Sheep. Am. J. Vet. Res., 21, (Jan., 1960): 81-83.*]

## Postnatal Tooth Development in Cattle

This study was designed to establish the chronology of enamel and dentin formation in cattle as accurately as possible in order to lay a firm foundation for future studies in tooth ring analysis, *i.e.*, the effects of specific physiologic and pathologic stresses on enamel and dentin formation.

The chronology of development of the permanent incisor and canine teeth was established from analysis of radiographs obtained *in vivo* from 869 purebred cattle living under optimal nutritional conditions. It was found that development of the incisor and canine (anterior) teeth followed an orderly sequence. The first incisor began to develop enamel and dentin when the calf was 6 months of age; the second incisor at 12 months, when the crown of the first incisor was completed; and the third incisor

at 20 months, soon after the crown of the second incisor was completed at 18 months. The canine tooth began its enamel and dentin formation at 27 months, 3 months after the third incisor crown was completed.

Eruption and root formation followed a similar orderly sequence from the first incisor to the canine tooth. The first incisor emerged into the oral cavity at 23 months, the second incisor at 30 months, the third incisor at 36 months and the canine teeth at 42 months. Root formation was four fifths completed at the time of emergence.

No significant differences in the chronology of tooth development in the different breeds or sexes were found, in spite of relatively large development and genetic differences between dairy and beef cattle.

It is hoped that this study will provide a satisfactory baseline for future studies which relate the effects of physiologic stress such as birth, weaning, pregnancy, and lactation, as well as pathologic factors such as nutritional deficiencies, fluorosis intoxication, and infectious diseases upon the enamel and dentin (tooth ring analysis).—[*W. A. Barry Brown, Paul V. Christofferson, Maury Massler, and Marvin B. Weiss: Postnatal Tooth Development in Cattle. Am. J. Vet. Res., 21, (Jan., 1960): 7-34.*]

## African Swine Fever Virus in Swine Bone Marrow

Cultures were prepared from swine bone marrow and buffy coat cells in a nutrient medium consisting of 80 per cent mixture 199 and 20 per cent normal swine serum. Large granular cells which were also phagocytic appeared to predominate, and multinucleated cells appeared in the cultures as early as 72 hours. Fibroblast-like cells developed only after prolonged incubation. All African swine fever virus (ASFV) isolates tested produced hemadsorption followed by cytolysis involving both the large granular and multinucleated cells, but the fibroblast-like cells were unaffected.

The reaction could be observed microscopically as early as 18 hours after inoculation or as late as 10 days, depending upon the titer of the virus. Serums from African swine fever survivors inhibited the hemadsorption reaction but did not neutralize the cytopathic effect. Buffy coat cultures were also used for the titration of infectious materials.

Since the reactions attributed to ASFV are not produced by hog cholera virus (European swine fever virus), the use of buffy cultures may be valuable as a diagnostic aid.—[*Winston A. Malmquist and David Hay: Hemadsorption and Cytopathic Effect Produced by African Swine Fever Virus in Swine Bone Marrow and Buffy Coat Cultures. Am. J. Vet. Res., 21, (Jan., 1960): 104-108.*]

## Experimental Edema Disease in Pigs and in Mice

Thirty pigs, injected intravenously with extracts of hemolytic *Escherichia coli* (edema disease isolates), developed acute reactions atypical of edema disease. In 5 that died 3 to 22 hours postinjection, prominent lesions were edema of the gallbladder and edema and hyperemia of the colon. Edematous areas were present in the stomachs of 4.

Typical, fatal edema disease was produced in test swine by injecting intravenously, extracts of the bowel contents of edema disease specimens. Mice injected intravenously or intraperitoneally with bowel extract generally developed nervous signs and hydrothorax within 48 hours. Massive subcutaneous edema developed in some mice that survived for 4 or 5 days.

Immune serums, prepared against bowel extracts and extracts of hemolytic *Esch. coli* 0138:K81(B):H14 and 0139:K82(B):H1,

neutralized the edema disease-producing properties of bowel extract when the serums and antigens were mixed prior to injection. When bowel extracts were given intravenously and the serums by other routes, it was necessary, in order to achieve protection, to increase serum dosage and to give it many hours before the antigen.—[*D. W. Gregory: Experimental Edema Disease (Hemolytic Escherichia coli Toxemia) in Pigs and in Mice. Am. J. Vet. Res., 21, (Jan., 1960): 88-94.*]

# New Books

## The Avian Embryo

This book attempts to bring together, in one volume, all the known scientific facts about the structural and functional development of the avian embryo.

The volume is written as a text for advanced students and teachers in zoology and comparative embryology as well as a reference work for research workers in medico-biological and numerous other fields in which the avian embryo is used as an experimental material.

The contents of the book includes a discussion of the reproductive cells, fertilization and fertility, early morphogenesis, and the development of each of the systems of the embryo including the extraembryonic membranes. In addition to the text, there is an extensive index making the volume exceedingly useful to the teacher of veterinary embryology as well as a reference book for veterinary research workers.

In the preparation of this book, the author made a critical study of more than 7,000 original publications, about two thirds of which were written in languages other than English. Of these, about 2,700 are listed in the bibliography, making the volume an excellent bibliography of the literature on the avian embryo.

The details of the subject material, together with the extensive index and bibliography, makes this an excellent reference work on the avian embryo.—[*The Avian Embryo. By Alexis L. Romanoff. 1305 pages; 441 illustrations. Macmillan Co., 60 5th Ave., New York, N. Y. 1960. Price $35.00.*]—Al W. Stinson.

## The Truth About Dogs

A veterinarian, breeder, and judge of dogs speaks out bluntly and frankly about many of the things that are wrong in the dog world. (Many of us have shared these criticisms for years but have hesitated to discuss them with clients for fear of offending.) A glance at the chapter headings reveals the nature of the major topics dealt with: The Truth About Dogs Today; The Origin of the Breeds; How Dogs Have Degenerated; What's Wrong with Dog Owners; What's Wrong with Institutions; the Breeds Today as I See Them; What You Can Do to Improve Dogs; What Institutions Can Do to Improve Dogs; How to Buy A Dog; and How to Avoid Dissatisfaction with Your Dog.

The author is favorably disposed toward field trials, hounds, and several breeds that have not become popular; he deplores some characteristics of the popular breeds and

places responsibility for them on breeders, owners, and show standards. In this book, there is much sound advice for both present and future dog owners.

More careful editing might have clarified or avoided several minor points which may trouble the critical veterinary reader: (1) In this book, canine eugenics is incorrectly defined as the study of all agencies under our control which may *improve or impair* the inborn qualities of future generations of dogs physically or mentally; dysgenics is said to mean the opposite. (2) Dogs are said to come from timber wolves. (3) Although rightly criticizing the propagation of breeding stock not able to whelp normally or requiring cesarotomy, the author goes on to infer that ether anesthesia is the only alternative to barbiturate anesthesia for this type of surgery. Perhaps failure to recognize epidural anesthesia in combination with narcotics was unintentional. (4) Mentioning management of mismating, the author uses the opportunity to recommend the injection of a yeast preparation to cause absorption of fetuses. (5) Explaining why dogs pursue a bitch in estrus, the author says the dogs fail to detect the "usual 'keep away' odor."

This thought-provoking book is recommended reading for both veterinarian and client. The frank discussion of the evils in dogdom may help to eliminate some of them. —[*The Truth About Dogs. By Leon F. Whitney. 184 pages; illustrated. Thomas Nelson and Sons, New York, N. Y. 1959. Price $3.50.*]—D. A. P.

## Experimental Surgery

This well-known text on experimental surgery has been considerably expanded in content over the first edition released in 1937. The quotations cited by the authors throughout the text add a sense of humor to the writings, which otherwise are serious reportings on important experimental designs.

If one finds time for nothing else, he should read the introductory remarks. This has been prepared in a varying style, suggesting that we know all or nothing regarding body functions and that the researcher has all to study or that the surgeon could not possibly be prepared for a successful course of action. In essence, a real challenge is presented by these introductory remarks to anyone who wishes to embark upon original thinking and action to either improve himself as a surgeon or by making a notable contribution for the improvement of man or animal health through surgery. After reading the introductory remarks, I was reminded of the statement made by an outstanding physician-surgeon before a notable group of his colleagues to the effect that he wished there were fewer persons doing surgery but more surgeons.

Nothing is more distressing than the constant battle between the animal experimenter and the antivivisectionist movement, which seems to have no end. I refer you to the second chapter in this book, which will certainly provide new ammunition for the members of the medical profession who must, in a dignified manner, continue to support in public the need for animal experimentation. It is of particular note to examine the testimony of the late Dr. M. C. Hall, the distinguished zoologist and veterinarian, who has been quite liberally quoted in the text.

It is difficult to limit the usefulness of this book, but it will prove to be of the greatest value to the person conducting surgical research. For the student of medicine or the practitioner, it will prove valuable as a reference text. Practically every tissue of the body has been approached experimentally, but for the routine application of the technique of surgery, the practicing surgeon will find particular use for the chapter on anesthesia, surgical physiology of intestinal obstruction, and the one on absorption and excretion of the intestine and colon.

I would like to draw the "Epilogue" to the attention of the one who aspires to be a teacher-surgeon. Perhaps this writing will inspire each of us to strive for greater perfection in our teaching technique or to revert, as is noted in the Epilogue, to the part of the happy moron.—[*Experimental Surgery. By J. Markowitz, J. Archibald, and H. G. Downie. 4th ed. 931 pages; illustrated. Williams and Wilkins Co., Baltimore 12, Md. 1959. Price $12.50.*]—Mark W. Allam.


## Further Reports of the Group Conferences Held Before, During, and After the Kansas City Convention

Due to the interest of the readers in the reports of allied organizations which met before, during, and after the AVMA's Kansas City Convention, in August, 1959, we are once again publishing the various notices of these meetings which came to us after our deadlines.

The other reports appear in the Nov. 1, and the Dec. 1, 1959, issues of the JOURNAL.

### American Association of Avian Pathologists

During the meeting of the American Association of Avian Pathologists at the AVMA Convention in Kansas City, on August 25, the following officers were elected: Drs. Henry Van Roekel, Amherst, Mass., president; Steve B. Hitchner, Madison, Wis., vice-president; and Morris S. Cover, Newark, Del., secretary-treasurer.

Among the basic precepts of this organization are: to stimulate scientific progress on avian pathology; to encourage training on poultry diseases and management in schools of veterinary medicine; to encourage graduate and other forms of advanced training in avian diseases; and to support the publication of the *Journal of Avian Diseases.*

s/M. S. COVER, *Secretary.*

### American Association of Veterinary Clinicians

The 1959 meeting of the American Association of Veterinary Clinicians met at Dykstra Hall at Kansas State University in Manhattan, on August 22.

Among the papers presented in the scientific portion of the program were: Drs. H. H. Hoyt, University of Minnesota—standard nomenclature of animal diseases; N. B. Tennille, Oklahoma State University—instruction in veterinary radiology; R. B. Barrett, Kansas State University—radiology as a diagnostic aid; W. D. Carlson, Colorado State University—functions of the radiologist and the clinician; and J. C. Donham, Ohio State University and S. J. Roberts, New York State Veterinary College—ambulatory clinic operations.

Newly elected roster of the A.A.V.C. is as follows: Drs. O. R. Adams, Colorado State University, president; S. J. Roberts, Cornell University, vice-president; and R. E. Watts, Washington State University, secretary-treasurer.

The meeting for 1960 will be held at Colorado State University, the Saturday preceding the AVMA meeting in Denver, Colo.

s/R. E. WATTS, *Secretary.*

### American College of Veterinary Pathologists

During the AVMA Convention in Kansas City on August 24, a seminar on the present and future uses and development of veterinary clinical pathology was held under the auspices of the American College of Veterinary Pathologists.

The first part of the seminar was led by Dr. David L. Coffin of the Animal Medical Center in New York City. First panelist was Dr. John Bentinck-Smith of the New York State Veterinary College who presented a case report of hereditary bleeding tendency in 6 calves from the same dam.

The next panelist, Dr. F. O. Wright of Crawford Animal Hospital, Garden City Park, N.Y., described the clinicopathologic methods used in a hospital where five veterinarians participated in a group practice in which a part-time medical technician, a local clinical pathologist, and a local hematologist were available for consultation.

Dr. B. J. McSherry, of the Ontario Veterinary College, discussed his interest in calcium, phosphorous, and magnesium levels in the blood of livestock.

Dr. Richard L. Johnston of the Upjohn Company, Kalamazoo, Mich., described the use of clinicopathologic methods in the pharmaceutical industry, especially in the testing of biological activity of materials.

Dr. Johnston stressed the correlation of all data in order to arrive at a proper diagnosis. He also considered the use of ancillary peo-

ple such as biochemists, physicists, and electron microscopists to be vital in arriving at definitive answers.

A lively discussion followed on the hiring and evaluation of technicians, clinical pathology in large animal practice, the proper interpretation of laboratory tests by clinicians and the differing contributions and skills of clinical pathologists and technicians.

The second half of the program was devoted to a discussion of the teaching of veterinary clinical pathology; chairman of this second session was Dr. H. H. Berrier of the University of Missouri. He described and illustrated the various methods used at his school.

First speaker on the panel, Dr. Margaret Sloss of Iowa State University, emphasized some general problems in the use of the clinicopathologic laboratory: 1—when to require tests; 2—what tests should be requested; 3—the preparation and submitting of samples; and 4—their interpretation.

Next, Dr. Embert H. Coles of Kansas State University discussed bacteriology at the laboratory level.

## American College of Veterinary Toxicologists

The annual meeting of the American College of Veterinary Toxicologists was held in the Tea Room of the Hotel Muehlebach in Kansas City, Mo., on August 23. Attendance approximated 60.

The session was called to order by its president, Dr. H. E. Furgeson of Anaconda, Mont. In his opening remarks, he stressed the wide range of professional interests represented by the membership and outlined the development of the organization and its rate of growth during the past three years.

The president's address was complemented by the report of the secretary and the report of the executive council, both given by Dr. William F. Harris of Puyallup, Wash.

The technical program began with a paper by Dr. D. W. Jolly, associate editor of *Modern Veterinary Practice*, on the uses and hazards of organo-phosphorus compounds in animals. Other presentations included: Drs. Glen C. Halver, Glendive, Mont.—salt poisoning in range cattle; B. J. Camp, College Station, Texas—toxic principle of *Acacia berlandieri;* T. A. Hymas, Midland, Mich.—toxicity of internal insecticides; H. W. Reuber, Stillwater, Okla.—toxicity studies on stilbestrol; Capt. E. E. Dean, Denver, Colo.—effects of ionizing radiation on lymphocytes; Paul B. Hammond, St. Paul, Minn.—effects of EDTA and BAL on the excretion of lead in cattle.

One of the major problems before the meeting was the consideration of formal affiliation of the A.C.V.T. with the AVMA. One of the Board's basic objectives is to establish a group of specialists who will "accumulate, evaluate, and disseminate" information of a toxicologic nature for the veterinary profession.

The next meeting of the board was held at Salt Lake City, Utah, on Jan. 20, 1960. Included on the program was the semiannual business meeting of the executive council.

In the scientific portion of this meeting, Capt. Rudolph A. Hoffman of Holloman Air Force Base, N.M., spoke on primary cosmic radiation, its physical characteristics, and its potential biological hazard to manned space flights. Dr. George Merriman of Tennessee reported on fluorosis studies at the Tennessee Experiment Stations and Dr. Ralph Fogleman, Palo Alto, Calif., discussed the role of the commercial analytical laboratories in the field of veterinary toxicology.

s/WILLIAM F. HARRIS, *Secretary.*

## Conference of Public Health Veterinarians

The Conference of Public Health Veterinarians met at the Hotel Muehlebach in Kansas City on August 22.

On Oct. 21, 1959, at the business session held in conjunction with the annual meeting of the American Public Health Association, Dr. Robert K. Anderson succeeded Dr. Max Decker as president of the Conference.

Dr. Anderson is presently professor of veterinary bacteriology and public health in the College of Veterinary Medicine at the University of Minnesota.

He served as secretary-treasurer of the Conference in 1951-1952. He had also been president of the Colorado Public Health Association (1955-1956), and first vice-president of the Minnesota Public Health Association in 1958-1959.

Dr. Anderson is currently a member of the AVMA Council on Public Health and Regulatory Veterinary Medicine, and first vice-president of the Minnesota Public Health Association.

Colonel Mervin B. Starnes of the Walter Reed Army Institute of Research is the new president-elect of the Conference and Dr.

Joe W. Atkinson of the U.S. Public Health Service, has been re-elected secretary-treasurer.

Executive committee members are: Dr. John Mason, New Mexico State Department of Public Health; Dr. Ronald L. Hectorne, Kentucky State Department of Health; Lt. Col. U. S. Grant Kuhn, III, V.C., USAF; and Dr. Max Decker, Michigan State Department of Health.

s/Joe W. Atkinson, *Secretary.*

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### $9.6 Million Spent on Nutrition Research

A total of $9.6 million was spent to finance some 1,200 research projects in the field of nutrition during the 1959 fiscal year. Dale R. Lindsay, assistant chief for the division of research grants, National Institutes of Health (NIH), reported this figure on the basis of a survey of research-spending by both private organizations and the federal government. Expenditures averaged $8,000 per study.

Federal agencies contributed most of the support. Chief among these was the USDA which underwrote 693 nutrition projects for $3,127,809. Next came the NIH with 186 research grants amounting to $2,763,339.

Other federal agencies, including the National Science Foundation, Atomic Energy Commission, Department of Defense, Fish and Wildlife Service, and the Food and Drug Administration, supported 76 studies totaling $1,533,684.

Nongovernmental agencies spent nearly a million dollars on 93 investigations. Various intramural-agency programs made up the balance spent.—*Illinois Edition, Prairie Farmer (Dec. 19, 1959): 7.*

## *Among the States and Provinces*

### Arizona

Mesa—State Association Elects New Roster.—Officers of the Arizona V.M.A. elected for the year 1960 are as follows: Drs. Jack P. Fuller, Phoenix, president; Walter F. Condon, Tucson, president-elect; A. Marion Smith, Phoenix, secretary-treasurer; and Ned W. Rokey, Mesa, executive secretary.

s/Ned W. Rokey, *Executive Secretary.*

### Arkansas

Little Rock—State Association's Annual Meeting.—The 44th annual meeting of the Arkansas V.M.A. was held at the Hotel Marion, Jan. 10-12, 1960. Registration included the largest number of veterinarians to ever attend an Arkansas meeting.

Those appearing on the program were as follows: Drs. David E. Bartlett, American Breeders Service, Chicago, Ill.—improvements in the field of artificial insemination; James R. Hay, AVMA director of professional relations—the AVMA in action; J. Gilbert Horning, Houston, Texas—proven aids in dog and cat practice; C. C. Pearson,

Dr. Harvie R. Ellis

Oklahoma State University Field Laboratory, Pawhuska, Okla.—anaplasmosis; A. H. Quin, Jensen-Salsbery Laboratories, Kansas City, Mo.—leptospirosis; K. K. Stinson, Bastrop, La.—veterinary medicine and livestock industry in South Korea; E. L. Taylor, Georgetown, Ky.—foaling season; N. B. Tennille, Oklahoma State University, Stillwater, Okla.—radiographic evaluation of some esophageal diseases; and G. B. Van Ness, Washington, D.C.—the ecology of anthrax epizootics.

#### Veterinarian of the Year

Arkansas' "Veterinarian of the Year" Award was presented to Dr. Harvie R. Ellis.

public health veterinarian with the Arkansas State Board of Health and a retired colonel of the U.S. Army's Veterinary Corps. Dr. Ellis is doing an outstanding job in gathering information for the publication of the *Arkansas Animal Morbidity Report.*

He has furnished the Arkansas press with accurate and timely information concerning rabies epizootics within the different parts of the state. In addition, he has formulated a program which covers all the fields of veterinary public health in Arkansas. Dr. Ellis is president of the Arkansas V.M.A. for 1960; he has also served as its vice-president. He is currently secretary-treasurer of the Pulaski V.M.S.

In addition to Dr. Ellis, the other officers of the Association for 1960, are: Drs. Charles D. Labahn, Fort Smith, vice-president; Thayer D. Hendrickson, Little Rock, secretary-treasurer; Robert E. Fahr, Paragould (N.E. district); Joe Cox, Arkadelphia (S.W. district); and David Ibsen, Little Rock (trustee-at-large).

s/THAYER D. HENDRICKSON,
*Secretary-Treasurer.*

## California

SAN FRANCISCO—VETERINARIANS FROM CALIFORNIA, NEVADA, AND OREGON TO MEET IN "GOLDEN GATE CITY."—New methods of treating infectious diseases of large and small animals are being reported to veterinarians from California, Nevada, and Oregon at a conference on "New Horizons in Chemotherapy" at the Fairmont Hotel, April 1.

The meeting, the "Fourth Regional Conference on the Nitrofurans in Veterinary Medicine," is being held under the joint auspices of the Bay Counties V.M.A. and Eaton Laboratories, developers and producers of the nitrofurans.

General chairman of the meeting will be Dr. Loris O. Johnson, president, Bay Counties V.M.A. Dr. Tom D. Harris, Jr., past president, Bay Counties V.M.A., will chairman the small animal session, and Dr. Jack W. Hylton, San Jose, will chairman the large animal session. Dr. S. A. Peoples, professor of pharmacology and toxicology, School of Veterinary Medicine, University of California, is to speak at the luncheon.

Reports on the use of this relatively new group of drugs and other aspects of the treatment of diseases of cattle, pigs, horses, dogs, and cats will be presented by clinical investigators from this country and Canada.

Speakers will include: Drs. Glenn E. Taylor, Modesto; M. J. Pelczar, Jr. (Ph.D.), University of Maryland; Henry E. Paul (Ph.D.), Eaton Laboratories, Norwich, N.Y.; E. W. Ellett, School of Veterinary Medicine, A. & M. College of Texas; D. L. Piermattei, Michigan State University; William D. Carlson, Colorado State University; R. J. Nelson, Lakeside Animal Hospital, Milwaukee, Wis.; William V. Lumb, Michigan State University; S. M. Michaelson, University of Rochester; R. Frank Vigue, Nasson College, Springvale, Maine; Richard S. Witter, Columbus, Ohio; M. F. Andrews, North Dakota Agriculture College; C. K. Roe, Ontario Veterinary College.

## Connecticut

HARTFORD—DR. JUNGHERR'S TESTIMONIAL DINNER.—The quarterly meeting of the Connecticut V.M.A. was held Nov. 4, 1959, in the Hotel Bond, and was devoted mainly to a testimonial dinner for Dr. Erwin L. Jungherr, former chairman of the Department of Animal Diseases at the University of Connecticut. He has been associated with the American Cyanamid Company in Pearl River, N.Y., since his retirement on July 1, 1959.

Dr. Jungherr had served the University of Connecticut for 29 years. During his tenure, the Department of Animal Diseases grew from five members to 51 staff members and employees (*see* the JOURNAL, June 15, 1959, pp. 573-574).

At his testimonial dinner, Dr. Charles F. Helmboldt, who succeeded Dr. Jungherr at the University of Connecticut (*see* the JOURNAL, Aug. 15, 1959, p. 240), lauded Dr. Jungherr as the University of Connecticut remembers him; Dr. Jean V. Smith, state veterinarian, paid tribute from the standpoint of the Department of Agriculture; and Dr. Richard T. Gilyard, Waterbury, bestowed the plaudits of the practicing veterinarians.

In part, Dr. Jungherr's testimonial read, "His devotion to duty, his zealous interest and wise counsel to the practicing veterinarians in all disease problems have contributed greatly to the success of the various disease control programs in Connecticut. The veterinarians in Connecticut will forever remain grateful to him."

The balance of the program was an illustrated talk on diseases of the eye by Dr. David W. Parke, ophthalmologist, Meriden.

s/E. H. PATCHEN, *Executive Secretary.*

STORRS—UNIVERSITY RECEIVES RENEWAL OF DAIRY CATTLE GRANT.—A grant-in-aid to the University of Connecticut has been renewed by the American Cyanamid Company for studies of drugs and biological products to combat diseases of dairy cattle.

The research program is under the direction of Dr. W. N. Plastridge. In conducting this study, he will utilize both university facilities and cooperating dairy herds in the state. He also plans to investigate the possibilities of developing a vaccine for *Vibrio fetus* abortion in dairy cows.

## Georgia

RADIUM SPRINGS—SOUTH GEORGIA ASSOCIATION MEETS.—At the regular quarter meeting of the South Georgia V.M.A. on January 10, the following officers were elected for 1960: Drs. Jesse D. Derrick, Montezuma, president; Robert S. Sharman, Albany, vice-president; and Maurice W. Hale, Tifton, secretary-treasurer.

S/MAURICE W. HALE, *Secretary.*

• • •

ATLANTA—THIRD CONFERENCE ON NITROFURANS IN VETERINARY MEDICINE.—Dr. Thomas J. Jones (below, second from left), dean of the School of Veterinary Medicine at the University of Georgia, greets veterinarians from New York and Georgia at the opening of a meeting on "New Horizons in Chemotherapy: Third Regional Conference on the Nitrofurans in Veterinary Medicine," held recently in Atlanta.

Dr. Jones was chairman of the conference, which was attended by 150 veterinarians from six southern states and by students from the senior veterinary classes at both the University of Georgia and Auburn University.

## Illinois

URBANA—UNIVERSITY OF ILLINOIS UNVEILS PLANS FOR NEW HOG FARM.—Now under construction at the University of Illinois, the new Moorman Animal Breeding Research Farm will be one of the most outstanding research systems in the country when completed in 1961.

It is being established with a $200,000 grant from the Moorman Manufacturing Co. in Quincy. The breeding program is designed to develop improved lines of hogs. Using Durocs and Yorkshires, the researchers will actually develop five lines. They will include two Duroc lines, two Yorkshire lines, and one Duroc-Yorkshire cross-bred line.

The farm's physical setup will also allow scientists to study management, environmental, disease, and engineering problems.—*Nat. Hog Farmer, 5, (Jan., 1960): 16.*

## Iowa

AMES—NATIONAL SWINE INDUSTRY CONFERENCE.—Representatives from all segments of the swine industry—producers, farm organizations, feed manufacturers, veterinarians, equipment manufacturers, marketing agencies, meat packers, retailers, research and educational organizations, and the agricultural press—met in November, 1959, for

**Shown with Dr. Jones (second from left), are left to right—Drs. Joe. B. Crane, Valdosta, president, Georgia V.M.A.; Harold Roberts, director, Division of Veterinary Medicine, Eaton Laboratories, Norwich, N. Y., which sponsored the meeting; C. J. Mikel, Georgia V.M.A. president-elect; A. M. Mills, Athens, secretary-treasurer, Georgia V.M.A.; Charles C. Rife, Atlanta.**

the second National Swine Industry Conference. Registration numbered 560; a 50 per cent jump over the first meeting in Lafayette.

Held in the Memorial Union Building of Iowa State University, the meeting was intended to improve the efficiency of the swine and pork industry. . .to better fulfill its responsibility to the consuming public. A third conference is being planned for next fall.

Among the numerous speakers on the meeting's agenda was A. B. Evans of Cedarville, Ohio, who presented the swine producer's view. Speaking at the disease control workship, Mr. Evans said, "The producer today is looking to the veterinary profession for the most help and advice that has ever been demanded of the profession." First of all, he said, the hog raiser wants more research on swine diseases. Second, he wants veterinarians working with producers in setting up disease control programs which can be of help to them. He further stated that the local swine association in his county has invited local veterinarians to a meeting to discuss such a program. He said that he believed healthier hogs and an improved swine program in the county would result. *Nat. Hog Farmer, 5, (Jan., 1960):—1, 4, & 30.*

• • •

CEDAR RAPIDS—EASTERN PORTION OF STATE HOLDS SCIENCE FAIR.—The first Eastern Iowa Science Fair, which includes 13 counties, was held in Cedar Rapids on March 19-20, 1960. Students with the top prize-winning exhibits will represent the eastern Iowa area of Iowa at the National Science Fair.

s/MRS. NORMAN C. JOHNSON, *Correspondent.*

• • •

DES MOINES—CENTRAL ASSOCIATION MEETS.—The November meeting of the Central Iowa V.M.A. was held in conjunction with the Polk County Medical Association at the Savery Hotel. The attendance totaled 47 veterinarians and 90 physicians.

A social hour, courtesy of the Library Club, preceded the dinner. Following dinner, Dr. Bernard C. Barnes, president of the Polk County Medical Association, welcomed the attendees and introduced Dr. Grant E. Blake, who in turn, introduced Dean I. A. Merchant, Dr. F. B. Young, and Dr. A. L. Sundberg.

Dr. Erskine V. Morse, moderated a panel discussion on leptospirosis in animals and man. He also summarized the disease in animals. Additional panel members and their respective topics were as follows: Drs. Paul Bennett, Ames—laboratory aspects of leptospirosis; James E. Kelsey (M.D.), Des Moines, and Erling Larson (M.D.), Davenport—a case report; and Richard A. Tjalma, Iowa City—a report of the recent epizootic of leptospirosis in Cedar Rapids.

s/S. L. HENDRICKS, *Secretary to the Central Iowa V.M.A.*

## Louisiana

BATON ROUGE—29TH ANNUAL CONFERENCE.—The Louisiana V.M.A. met at Louisiana State Unversity in the horticulture-agronomy building, Jan. 26-27, 1960, during the 29th annual conference for veterinarians, sponsored by the Department of Veterinary Science through the General Extension Division. Sixty-four members attended the business meeting.

Among the participants on the program were: Drs. C. A. Manthei, Beltsville, Md.—national animal disease laboratory and animal disease research-USDA; W. H. Beckenhauer, Lincoln, Neb.—urethrotomy-urinary calculi and parakeratosis—gut edema; E. C. Burns, Baton Rouge—insecticides for large and small animals; J. L. Swalley, San Francisco, Calif.—unusual clinical cases and the use of bedside tests in fluid therapy management; H. J. Hill, Denver, Colo.—philosophy of bull evaluation; H. B. Elliot, Baton Rouge—using diagnostic laboratories; A. F. Ranney, Washington, D.C.—nationwide status of tuberculosis; A. M. Stefanski, Crowley—tuberculosis in Louisiana; and J. P. Davis, Jr., Shreveport—heartworm surgery in the dog.

One of the most important topics discussed during the business meeting concerned an agreement among the members to elect an executive secretary. This election will take place at the Association's annual meeting which will be held in New Orleans, July 29-30, 1960.

s/ROBERT K. MORRIS, *Secretary.*

## Michigan

EAST LANSING.—Dr. Edward D. Devereux has been named assistant dean of the College of Veterinary Medicine at Michigan State University.

Dr. Devereux will continue as professor of microbiology and public health but will also aid Dean W. W. Armistead, primarily in matters of on-campus education.

Born in Downers Grove, Ill., Dr. Devereux obtained his B.S. degree in 1923 from Knox College. In addition, he received an M.S. degree in 1925 and a Ph.D. degree in 1927, both from the University of Illinois.

He has been teaching and doing research at M.S.U. since 1927 and is the author of numerous scientific publications and the co-author of the "Laboratory Manual for Beginning Bacteriology."

He recently served as acting head of the Department of Microbiology and Public Health.

## Missouri

ST. LOUIS—GREATER ST. LOUIS ASSOCIATION MEETS.—The last meeting of the Greater St. Louis V.M.A. was held at the Coronado Hotel on March 4, 1960.

The program committee featured a discussion on nutrition by Mr. Herbert Schaefer of the Ralston Purina Company.

S/EDWIN E. EPSTEIN, *Secretary.*

## Nebraska

LINCOLN—VETERINARIANS WITNESS OPERATION BY TELEVISION.—Veterinarians are shown (below) attending a conference on disease-free swine production at the University of Nebraska where they witnessed delivery of pigs, via closed-circuit television.

## Nevada

RENO—STATE'S WINTER MEETING.—At the recent annual winter meeting of the Nevada State Veterinary Association, the following officers were elected: Drs. A. A. Cuthbertson, Elko, president; John O'Harra, Reno, vice-president; and B. L. Hutcherson, Reno, secretary-treasurer.

Speakers on the Nevada program included: Drs. C. E. Cornelius, Blaine McGowan, and Alida Wind from the School of Veterinary Medicine at the University of California in Davis; Dario Marioni, practitioner, Sonoma, Calif.; and R. A. Stocking, practitioner, Los Angeles, Calif.

Dr. Murray Phillipson, Las Vegas, presented an interesting collection of slides from some of the veterinary schools on the Continent, England, and Scotland. Dr. K. L. Kuttler gave a report on the veterinary research activities of the University of Nevada's veterinary science department.

In addition, Drs. William Fisher, director, Division of Animal Industry, and E. E. Maas, director in charge, ARS-ADEB, each gave reports of their respective departments' activities within the state.

The annual summer business meeting of the Nevada State V.A. will be held July 23, 1960, in Tonopah, and the 1961 annual winter meeting is scheduled for Las Vegas.

S/BRIAN L. HUTCHERSON, *Secretary.*

**Television in Nebraska**

**Helping televise the operation, were Kenneth Keyes, Archer (back to camera) and Richard Schomburg, Cedar Rapids, students at the Nebraska Vocational Technical School which supplied the equipment. Visiting veterinarians included, left to right behind TV camera—Drs. R. H. Cook, Lincoln; J. L. Calverley, Carman, Man. and Dr. Jon Gundmundson, Morden, Man. Looking on at extreme right is Dr. E. Crosby Howe, extension animal hygienist at the University of Nebraska.**

*Nebraska College of Agriculture Photo*

## Ohio

CINCINNATI—ANOTHER NEW ROSTER.—The 1960 officers of the Cincinnati V.M.A. are: Drs. Stanley Keller, president; P. B. Johnston, president-elect; Fred Leininger, treasurer; and Ronald A. Meeks, secretary.

s/R. W. JOHNSTON, *President-Elect.*

## Pennsylvania

PHILADELPHIA—KEYSTONE ASSOCIATION MEETS.—The regularly scheduled meeting of the Keystone V.M.A. was held on Jan. 27, 1960, in the new students' lounge at the University of Pennsylvania's School of Veterinary Medicine.

Since canine ear-cropping by veterinarians was only legalized in Pennsylvania in August, 1959, the Association devoted its program to the proper and humane methods for this procedure.

Dr. George Rosenberger (UP '39), Wilmington, Del., pictorially demonstrated his clampless ear-cropping method and local surgical companies displayed the clamps and tools which might be used. An informal discussion, including audience participation, completed the program.

s/J. L. KOLODNER, *Recording Secretary.*

## South Dakota

VERMILLION—DR. STALHEIM RECEIVES FELLOWSHIP.—Dr. O. H. Stalheim (TEX '41) has been awarded a postdoctoral research fellowship by the National Institutes of Health for advanced study in the Department of Bacteriology, School of Medicine, at the University of South Dakota. The fellowship became effective February 1.

His research will be conducted under the direction of Dr. C. D. Cox, department chairman, and will be concerned mainly with leptospirosis, the cause of such extensive economic loss in cattle and swine.

Dr. Stalheim has been practicing veterinary medicine in Vermillion for 16 years. While engaged in this fellowship work, his practice will be taken care of by Dr. K. E. Keenum of Stillwater, Okla., who will arrive in Vermillion in May.

s/C. D. Cox, *Correspondent.*

## Texas

COLLEGE STATION—A. & M. COLLEGE OF TEXAS SETS UP DISEASE-FREE PIG CLINIC.—Plans to set up a disease-free pig laboratory at the A. & M. College of Texas were inaugurated this year to test the practicality of such a program for Texas farms.

Dr. H. E. Redmond (TEX '39), of the Department of Veterinary Medicine and Surgery, said that a college building is being remodeled to accommodate three units which will be in operation next summer. In each of these units, there will be 12 incubators and one brooder with a capacity of 12 pigs each.

Dr. Richard Moore, currently engaged in graduate studies, will be back at the experiment station next summer to assist Dr. Redmond and to serve as a fieldman, working with all persons participating in the program.—*Nat. Hog Farmer, 5, (Jan., 1960):* 5.

## Washington

SEATTLE—ASSOCIATION ELECTS NEW ROSTER.—At the Jan. 18, 1960, meeting of the Seattle V.M.A., the following new officers were elected: Drs. T. Russell Kurtz, president; J. O. Virgin, president-elect; Philip Irwin, secretary; and G. W. McNutt, treasurer.

s/E. DOYLE MONTGOMERY,
*Retiring Secretary.*

# State Board Examinations

IOWA—May 31-June 1, 1960, Des Moines, Iowa. Applicants must be in the office of the Division of Animal Industry, State House, Des Moines, not later than 8:00 a. m., on May 31. Additional information may be obtained by writing: Dr. A. L. Sundberg, Chief, Division of Animal Industry, State House, Des Moines 19, Iowa.

MICHIGAN—June 20-21, 1960, Lansing, Mich. Examination to be written, practical, and oral. Applications must be on file at least 15 days before the examination, accompanied with a $25 fee. For application blanks and information, address: Corresponding Secretary, 641 Lewis Cass Building, Lansing, 13, Mich.

NORTH CAROLINA—June 20-22, 1960, Grove Park Inn, Asheville, N.C. Dr. James I. Cornwell, Secretary-Treasurer, North Carolina State Veterinary Examining Board, P.O. Box 9038, Asheville, N.C.

OHIO—June 6-8, 1960, Sisson Hall, College of Veterinary Medicine, Ohio State University, Columbus, Ohio. Applicants must be present at 8:00 a.m. on June 6. Dr. H. G. Geyer, Executive Secretary, Ohio Veterinary Medical Board, Ohio Departments Building, Room 720, Columbus 15, Ohio.

TEXAS—May 30-June 1, 1960, A. & M. College of Texas, College Station, Texas. The completed application must be received in the Board office not later than 30 days before the examination date. Mr. T. D. Weaver, Execu-

tive Secretary, Texas State Board of Veterinary Medical Examiners, 207 Capital National Bank Building, Austin 16, Texas.

UTAH—June 30-July 1, 1960, State Capitol Building, Department of Business Registration, Salt Lake City, Utah. Applications should be submitted to Mr. Frank E. Lees, Director of the Department of Business Regulation and Registration Division, State Capitol Building, Salt Lake City, Utah, by June 15. Registration fee is $15.

WEST VIRGINIA—June 20, 1960, Capitol Building, Room E—117 (ground floor of the east wing), Charleston, W. Va. For applications and information, write: Dr. Harry J. Fallon, Secretary-Treasurer, 200 Fifth St. West, Huntington, W. Va.

WISCONSIN—June 27-28, 1960, Madison, Wis. Dr. A. A. Erdmann, Chief Veterinarian, State-Federal Cooperative Program, 6 West, State Capitol, Madison 2, Wis.

## Deaths

Star indicates member of AVMA

**Walter C. Alvey** (KCV '18), Dallas, Texas, died following a heart attack on Nov. 28, 1959.

Until his retirement a few years ago, Dr. Alvey had been a meat inspector with the U. S. Department of Agriculture.

**Larkin S. Campbell** (KCV '04), 88, Topeka, Kan., died Dec. 19, 1959, in Kansas City where he had lived the past few months with his daughter, Mrs. Thelma Webber.

Dr. Campbell was with the USDA for 37 years.

**William J. Cant** (CVC '09), 78, Erie, Ill., died Nov. 29, 1959, following a brief illness.

Born in Thomaston, Conn., he received his preliminary education there, moving to Erie after his graduation from the Chicago Veterinary College in 1909. He continued his practice in Erie until his retirement in 1952.

**Arthur J. Damman** (WSC '05), 89, Ellensburg, Wash., died Nov. 24, 1959.

Born in Iowa, Dr. Damman was a pioneer of the Kittitas Valley section of the state having traveled by wagon there with his parents when he was six months old. He later moved to Vancouver, B.C., for a time, but he had spent the major portion of his life in Washington.

Prior to his retirement in 1956, he had been a meat inspector for Cascade Packing Company for ten years.

**Wayne A. Hornaday, Sr.** (KCV '12), Greensboro, N.C., died in November, 1959. One of Dr. Hornaday's sons, Dr. Wayne A. Hornaday, Jr. (UP '43), is currently practicing in Greensboro.

**Fred G. Kelley** (STJ '23), 76, Great Bend, Kan., died Nov. 20, 1959. On November 12, Dr. Kelley suffered a heart attack at the Lyons' sales pavilion where he had been the inspecting veterinarian for several years.

One of Dr. Kelley's sons, Dr. Donald (KSU '35), is currently associate professor of pathology at Kansas State University.

**Andrew N. Lawton** (ONT '05), 78, Brodhead, Wis., died in Rochester, Minn., Dec. 1, 1959, at the Methodist Hospital where he had undergone surgery a few weeks prior to his death.

Dr. Lawton had been mayor of Brodhead three times; at the time of his death, he was serving the town as alderman. He was a charter member of the Rock Valley V.M.A., having served as its president and then its secretary for many years. In 1933, he was president of the Wisconsin V.M.A.

Dr. Lawton is a native of St. Thomas, Ont., Can.

**William R. Salter** (CVC '12), 69, Des Moines, Iowa, died of a heart attack on Nov. 29, 1959. He had been in ill health five years.

Dr. Salter was born in Abilene, Kan. He had resided in Des Moines for 35 years.

★**Perry P. Starr** (WES '06), 84, Gainesville, Texas, died Dec. 7, 1959, after an extended illness. He had served the profession for 50 years and, in 1955, he was awarded life membership in the AVMA.

Dr. Starr was a charter member of the Texas V.M.A. and served as its president in 1923. He was on the state Veterinary Medical Examining Board for 13 years. In 1916, he organized the Cooke County Guernsey Cattle Club and, in 1950, he received honorary membership in the national association.

In addition, he had served as president and vice-president of the Cooke County Fair Association. Dr. Starr was a pioneer in the promotion of public health legislation in Texas.

**Henry K. Steckel** (OSU '17), 65, Reynoldsburg, Ohio, formerly of Tiffin, died Nov. 17, 1959, following a heart attack.

Dr. Steckel was a native of Columbus and a veteran of World War I.

# Women's Auxiliary

*Highlighting . . .*
*Alabama—Delaware—*
*Georgia—Iowa*

## Alabama

STUDENT CHAPTER.—The Women's Auxiliary of the Auburn University Student Chapter to the AVMA met recently for a fashion show at which the members and their children modeled clothes which the women themselves had created.

s/MRS. BARBARA MCMILLAN, *Secretary.*

## Delaware

NEWARK.—The Women's Auxiliary to the Delaware V.M.A. held its winter luncheon meeting at the Crystal Inn on Jan. 27, 1960. Mrs. Arthur P. Mayer and Mrs. E. L. Symington, both of Newark, were in charge of luncheon arrangements.

The officers for 1960 are: Mrs. George G. Rosenberger, Wilmington, president; Mrs. Paul Coogan, Wilmington, secretary-treasurer; Mrs. John L. Wilkins, Wilmington, membership chairman; and Mrs. Hobart Hare, Newark, publicity chairman. Mrs. Morris Cover, Newark, was selected as delegate to the AVMA National Convention and Mrs. E. L. Symington, the alternate delegate.

The history of the Auxiliary was presented by Mrs. E. L. Symington and several projects for the year were discussed. Plans were made for another meeting on April 7, to be held at the home of Mrs. Morris Cover, of Newark. Members will bring a sandwich and dessert will be served by the hostess.

## Georgia

STUDENT CHAPTER.—The first fall meeting of the Women's Auxiliary of the University of Georgia's Student Chapter to the AVMA was held to welcome the 17 new freshmen wives. Mrs. T. J. Jones, Mrs. A. M. Mills, and Mrs. G. L. Foy, faculty advisors, were introduced and Mrs. Jones presented a welcoming address.

Among its new activities, the Auxiliary had formed an employment agency, which is intended to help the wives of freshmen and also the wives of the upperclassmen. At Christmas time, the committees on publicity and public relations had the Auxiliary members bring in cartoons which were placed in scrapbooks and given to the local hospital.

Another Christman-giving project included sending toys to the Gracewood Training School for Mentally Retarded Children in Augusta. At a later meeting, the Auxiliary contributed $50 to the AVMA Student Loan Fund.

s/HELENE H. FULTON, *Vice-President.*

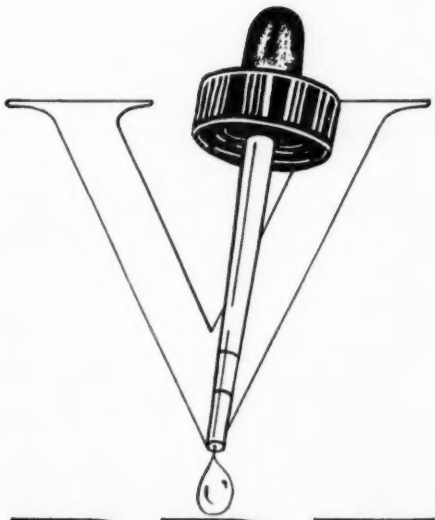
## Iowa

AMES—TEA HELD IN HONOR OF MRS. HAGAN.—Mrs. W. A. Hagan, wife of the first director of the National Animal Disease Research Laboratory, was welcomed at a tea Jan. 16, 1960, at the home of Mrs. I. A. Merchant, wife of the dean of the College of Veterinary Medicine at Iowa State University and current president of the Ames Auxiliary to the Iowa V.M.A.'s auxiliary.

**Among the guests at the tea were—front row, left to right—Dr. Margaret Sloss, past president of the Women's Auxiliary to the AVMA; Mrs. William A. Hagan, past vice-president of the International Women's Auxiliary to the Veterinary Profession; Mrs. I. A. Merchant, president of the Ames Auxiliary to the Iowa V.M.A. and state public relations chairman.**

**Second row, left to right—Mrs. Richard Lundvall, president-elect to the Iowa V.M.A.; Mrs. C. D. Lee, state president of the Women's Auxiliary to the Iowa V.M.A.; Mrs. S. L. Hendricks, Des Moines, state legislature membership chairman.**

A history of auxiliary activities connected with the College of Veterinary Medicine at Iowa State, from 1879 to 1960, was presented to Mrs. Hagan by Mrs. Merchant during the tea.



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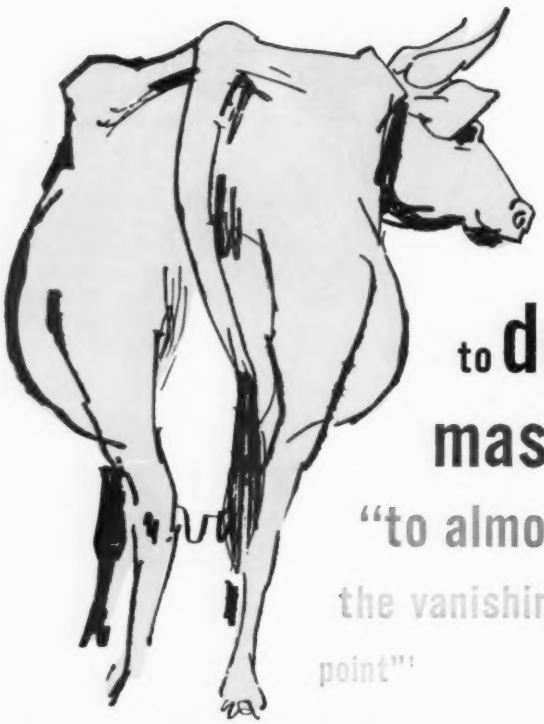

# to decrease mastitis "to almost the vanishing point"[1]

## FURACIN®-PENICILLIN GEL *veterinary*

Furacin with penicillin produces an enhanced antibacterial action that is at least additive, and may be truly synergistic. The combination covers a broader bacterial spectrum of gram-positive and gram-negative organisms than either agent alone.

*Indications:* For treatment of bovine mastitis caused by Staphylococcus aureus; Streptococcus agalactiae and dysgalactiae; Escherichia coli and Pseudomonas aeruginosa sensitive to Furacin.

SUPPLIED: A crystalline suspension of Furacin 2% and procaine penicillin G (13,333 units per cc.) in peanut oil with aluminum stearate 3%. In rubber-capped vial of 100 cc.; applicator tube of 7.5 cc., box of 12.

1. Kakavas, J. C., et al.: J. Am. Vet. M. Ass. 119:203 (Sept.) 1951.

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# WHAT IS YOUR *Diagnosis?*

**Make your diagnosis from the picture below — then turn the page ▸**

**Fig. 1—Radiograph of pelvis of the cat.**

*History.*—A purebred male Persian cat, 1 year old, showed signs of intermittent pain and stiffness of both hindlegs. He was reluctant to jump on and off high objects. The cat had never been injured or ill and the diet was considered to be excellent. A radiograph of the pelvis was taken (fig. 1).

## Here Is the Diagnosis

(*Continued from preceding page*)

*Diagnosis.*—Shallow acetabular development of the hip joints.

*Comments*—GERRY B. SCHNELLE*.—The radiograph, without question, shows shallow acetabulums of both hips. I hesitate to call this congenital hip dysplasia, or even hip dysplasia. I prefer to call it merely "shallow acetabulums" since we do not know whether the fault was developmental or the result of some bone disease. The tibias are bowed; perhaps this is a form of rickets.

**Fig. 2—Radiograph, ventrodorsal view, showing shallow acetabulum (A) and bowed tibias (B).**


NEWTON B. TENNILLE**.—The possibility of coxofemoral dysplasia cannot be ruled out. However, I am unable to visualize enough changes of the coxofemoral joints to explain all the signs of pain and restricted motion the cat was showing. Both tibias are bowed, which adds evidence to the impression that this cat at one time may have had osteogenesis imperfecta.

This is an unusual finding of the feline pelvis. The breeder has not recognized these signs in any other cats. This animal has not produced young but a radiograph of the pelvis of a half brother from the same dam shows no abnormality.

---

*Gerry B. Schnelle, V.M.D., Angell Memorial Animal Hospital, Boston, Mass.

**Newton B. Tennille, D.V.M., Oklahoma State University, Stillwater, Okla.

This report was submitted by E. E. Ruebush, D.V.M., Silver Spring, Md., and prepared with the assistance of Wayne H. Riser, D.V.M., M.S., Kensington, Md.

Our readers are invited to submit histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

# New, convenient, efficient way to treat porcine necrotic enteritis due to Salmonella choleraesuis

**CLINICAL RESULTS:** Field tests[1,2,3,4] indicate perorally administered FURACIN to be safe and specific for uncomplicated Salmonella infections and necrotic enteritis of swine and beneficial in other nonspecific enteric conditions of swine. Controlled laboratory studies[5,6] demonstrate that FURACIN Water Mix in drinking water for 7 consecutive days prevents mortality and aids in maintaining normal growth of pigs infected 2 days prior to treatment.

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**REFERENCES:** 1. Vickers, C. L.: Personal communication. 2. Filion, R., and Trepanier, M.: Personal communication. 3. Lannek, N., and Brag, S.: Vet. Med. 49:75-78 (Feb.) 1954. 4. Felgate, C. A., and Swann, H. C.: Vet. Rec. 68:259-262 (May 5) 1956. 5. Guthrie, J. E.: Vet Med. 47:307-314 (Aug.) 1952. 6. Guthrie, J. E.: Personal communication.

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# Improvements in the AVMA Group Insurance Program

At a recent trustees' meeting of the AVMA Group Insurance Trust held in Chicago on Dec. 17, 1959, substantial improvements in the AVMA Group Insurance Program were approved to be effective May 1, 1960. These changes are the outgrowth of a number of practical, constructive suggestions received from participating members, and they have been carefully considered by the trustees in their continuing study of ways to make the protection of the greatest possible value to AVMA members.

One of the major benefit improvements is an optional increase in the maximum disability income payment from $400 to $600 per month. The new maximum will be available to all members age 60 and under who are fully engaged in an occupation. Such increases are, of course, subject to approval by the insurance company.

In addition, a new partial disability benefit was added to the program. It provides that, following a period of total disability due to accident for which benefits are paid, 50 per cent (50%) of the disability income benefit will be paid for a period up to six weeks while the member is partially disabled (*i.e.*, when he is unable to perform one or more important daily duties of his occupation). No additional charge will be made for this benefit.

Due to the fine experience under the life insurance coverage, the insurance company agreed to a substantial reduction in the rate for this benefit and to an increase to higher amounts of this coverage. Because the reduced rates were so favorable, the trustees voted to increase the existing scale of life insurance benefits to nearly double the present amounts at only an approximate 50 per cent increase in the life insurance charge. Representative amounts of insurance under the old and new schedules are:

| Death occurring at age | Lump sum death benefit | |
|---|---|---|
| | Old schedule | New schedule |
| 25 and under | $10,500 | $20,000 |
| 30 | 8,750 | 16,675 |
| 40 | 5,250 | 10,000 |
| 50 | 2,625 | 5,000 |
| 60 | 1,200 | 2,275 |
| 65 and 66 | 800 | 1,525 |

The most important improvements are in the broadened and increased optional hospital-surgical benefit. Costs for medical expenses continue to climb upward, and the program has been expanded to accommodate them. The trustees believe that the additional charges necessary to make these improvements will be more than offset by members' satisfaction with the new benefits.

### Surgical Schedule

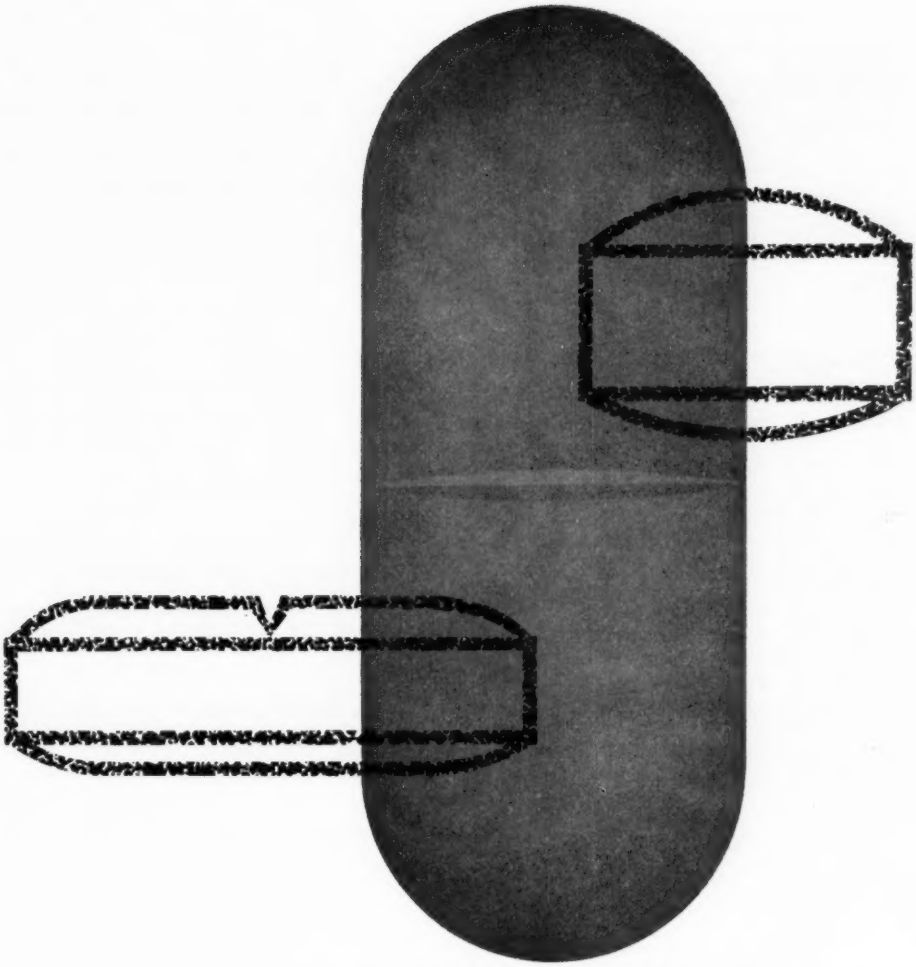
The present surgical schedule provides amounts for operations varying from $10 to a maximum of $200, depending on the nature of the surgery. The new schedule will provide benefits ranging from $10 to $350. Increases of 50 to 70 per cent are common in the benefits provided under the new schedule which brings the benefits much closer to the actual charges made by most surgeons. The following is a comparison of the maximum allowed under the old and new schedules for some of the operations listed in the Certificate of Insurance furnished each participating member:

| Operation | Old schedule | New schedule |
|---|---|---|
| Abdomen | | |
| Resection of stomach, bowel or rectum | $200 | $350 |
| Removal of, or other operation on, gallbladder | 150 | 220 |
| Appendectomy | 100 | 170 |
| Ear, Nose, or Throat | | |
| Mastoidectomy, one or both sides, simple | 125 | 210 |
| radical | 150 | 245 |
| Tonsillectomy or adenoidectomy or both | 30 | 60 |
| Removal of one or more nasal polyps | 15 | 30 |
| Fracture, treatment of | | |
| Thigh, pelvis, or spine (coccyx excepted) | 75 | 130 |
| Lower leg, ankle, kneecap, upper arm, elbow | 50 | 80 |
| Skull, jaw (alveolar processes excepted), collar bone, shoulder blade, forearm, wrist | 25 | 40 |
| Hernia | | |
| Surgical repair of: single hernia | 100 | 165 |
| more than one hernia | 125 | 210 |
| Rectum | | |
| Hemorrhoidectomy: external | 30 | 45 |
| internal, or internal and external | 50 | 75 |
| Cutting operation for fistula in ano | 50 | 75 |

### Addition of Hospital Out-Patient Care Benefit

To secure hospital benefits it has been necessary, heretofore, that a member or insured dependent be confined in the hospital

*(continued on adv. p. 38)*



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*(continued from adv. p. 36)*

and a charge made for room and board. Under the revision, the miscellaneous hospital expense benefit will be payable even though the insured is not confined. In keeping with the catastrophe protection of the coverage, the first $50 of such hospital expenses will not be payable but, after the first $50, 100 per cent of the hospital miscellaneous charges up to $450 will be paid and then 75 per cent of the charges between $450 and $2,500.

#### Change in Age for Insured Dependents

The policy has provided coverage for unmarried dependent children from ages 14 days to 19 years when dependent protection was elected. Now for members with unmarried dependent children who are in school or college, the benefits will be extended to cover such children until they reach 23 years of age.

A new certificate of insurance was mailed to all insured members, approximately March 15, with a letter providing additional details. The increase in coverage will be effective for accidents and sicknesses commencing on or after May 1, 1960.

The trustees report they are pleased with the continuing growth of the program, which has nearly doubled since its inception on May 1, 1957. It is especially gratifying that the program has progressed to an increasingly sound financial strength with a substantial contingency reserve to guard against temporary loss fluctuations plus the return of dividends to participants each year since the program started. They are confident the improved benefits will make the program even more attractive and insure its further growth.

Any AVMA member who is interested in learning about the AVMA Group Insurance Program may do so by writing the AVMA Group Insurance Trust, P. O. Box 1452, Chicago 90, Ill.

## APPLICATIONS

### Applicants Not Members of Constituent Associations

In accordance with paragraph (c) of Section 1, Article I, of the Bylaws, the names of applicants who are not members of constituent associations shall be published in the JOURNAL. Written comments received by the Executive Secretary from any active member regarding the application as published, will be furnished to the Judicial Council for its consideration prior to acceptance of the application.

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Urbana, Ill.
M.R.C.V.S., B.Sc., Royal School of Veterinary Studies, and University of Edinburgh.
Vouchers: Roger Link and Edwin I. Pilchard.

## Canada Removes Ban of U. S. Hogs and Pork

Effective Feb. 8, 1960, an order of the Canadian government removed the U.S. hog and pork embargo which had been imposed Aug. 29, 1952, because of the existence of vesicular exanthema (VE) in several states of the United States.

Vesicular exanthema embargoes are a handicap but not a critical barrier to the U.S. pork exports. Cuba and Mexico, the No. 1 and 2 importers, and West Germany, the No. 4 buyer of U.S. pork, did not impose an embargo. Venezuela, the No. 3 customer, has lifted its embargo.

United States pork exports came to 71 million lb. in 1959. This was close to the average of recent years and was 32 per cent greater than in 1958 when higher U.S. pork prices reduced exports. The United States exports some pork to more than 65 countries but does most of its business with a relatively few. In 1959, 81 per cent of the U.S. pork exports went to 11 countries.—*USDA Press Release, Feb. 8, 1960.*

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# COMING MEETINGS

**Notices of coming meetings must be received 30 days before date of publication.**

Alabama Veterinary Medical Association. Annual meeting. Battle House, Mobile, April 3-5, 1960. M. K. Heath, School Veterinary Medicine, Auburn University, Auburn, Ala., secretary.

National Institute of Animal Agriculture. Tenth annual meeting. Purdue University, Lafayette, Ind., April 3-5, 1960. Claude Harper, Department of Animal Science, Purdue University, Lafayette, Ind., treasurer.

American Animal Hospital Association. Annual convention. Statler-Hilton Hotel, Boston, Mass., April 19-22, 1960. Frank R. Booth, 3920 E. Jackson Blvd., Elkhart, Ind., executive secretary.

Florida, University of. Third annual conference for veterinarians. University of Florida, Health Center Auditorium, April 30—May 1, 1960. W. R. Pritchard, Head, Department of Veterinary Science, University of Florida, Gainesville.

Pennsylvania, University of. Annual conference for veterinarians. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, May 3-4, 1960. W. H. Rhodes, program chairman.

Kansas State University. Twenty-second annual conference. School of Veterinary Medicine, Kansas State University, Manhattan, May 19-21, 1960. Donald C. Kelley, chairman.

Mississippi State Veterinary Medical Association, Inc. Annual meeting, King Edward Hotel, Jackson, June 19-21, 1960. Joseph W. Branson, P. O. Box 4223, Fondren Sta., Jackson, Miss., secretary-treasurer.

North Carolina Veterinary Medical Association. Fifty-ninth annual summer meeting. Grove Park Inn, Asheville, June 21-23, 1960. J. T. Dixon, 3026 South Main St., Winston-Salem, N.C., secretary-treasurer.

California Veterinary Medical Association, Seventy-second annual meeting. Jack Tar Hotel, San Francisco, Calif., June 26-29, 1960. Mr. Ken Humphreys, 3004 16th St., San Francisco 3, Calif., executive secretary.

Virginia Veterinary Medical Association. Summer meeting. Shoreham Hotel, Washington, D.C., July 17-19, 1960. G. B. Estes, State Office Building, Richmond, Va., secretary-treasurer.

Kentucky Veterinary Medical Association. Forty-ninth annual convention. Sheraton-Seelbach Hotel, Louisville, July 18-19, 1960. L. S. Shirrell, 545 East Main, Frankfort, Ky., secretary.

Auburn University. Fifty-third annual conference for veterinarians. School of Veterinary Medicine, Auburn University, July 24-27, 1960. J. E. Greene, dean.

American Veterinary Medical Association. Ninety-seventh annual meeting. Denver-Hilton Hotel, Denver, Colo., Aug. 15-18, 1960. H. E. Kingman, Jr., 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

## Foreign Meetings

International Association of Veterinary Food Hygienists Second Symposium. Basel, Switzerland, May 15-21, 1960. Dr. A. Clarenburg, 1, Sterrenbos, Utrecht, The Netherlands, president.

International Congress of Physio-Pathology of Animal Reproduction and Artificial Insemination. Amsterdam, Netherlands, June 13-17, 1960. Dr. J. Edwards, Milk Marketing Board, Thames, Surrey, England.

First International Congress of Endocrinology. Technical University of Denmark, Copenhagen, July 18-23, 1960. Dr. Christian Hamburger, Statens Seruminstitut, Copenhagen S, Denmark, chairman of the executive committee.

Second International Course on Lyophilization. Lyon, France, Aug. 29—Sept. 9, 1960. For full details, contact: Dr. Louis R. Rey, Directeur des Cours Internationaux de Lyophilisation, Laboratoire de Physiologie, Ecole Normale Superieure 24, rue Lhomond, Paris 5, France.

Fourth International Congress on Animal Reproduction. The Hague, Netherlands, June 5-9, 1961. For additional information contact: the Secretariat of the Fourth International Congress on Animal Reproduction, 14, Burgemeester de Monchyplein, The Hague, Netherlands, Dr. L. Hoedemaker, secretary to the organizing committee.

Eighth International Congress of Animal Husbandry. Hamburg, Germany, June 13, 1961.

## Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Medical Association, the first Thursday of each month. James L. Chambers, 4307 Normanbridge Rd., Montgomery, Ala., secretary-treasurer.

Jefferson County Veterinary Medical Association, the second Thursday of each month. Dan P. Griswold, Jr., 714 S. 39th St., Birmingham, secretary.

Mobile-Baldwin Veterinary Medical Association, the third Tuesday of each month. Cecil S. Yarbrough, 4121 U.S. 90 West, Mobile, Ala., secretary.

North Alabama Veterinary Medical Association, the second Thursday of November, January, March, May, July, and September, in Decatur, Ala. Ray A. Ashwander, P.O. Box 1767, Decatur, Ala., secretary.

Northeast Alabama Veterinary Medical Association, the second Tuesday of every other month. Leonard J. Hill, P.O. Box 761, Gadsden, Ala., secretary-treasurer.

ALASKA—Anchorage Group of the Alaska V. M. A., the last Wednesday of each month at Fort Richardson Officers' Club or Thompson's Restaurant, 6th and I Streets, Anchorage, Alaska. Lt. Colonel E. H. Akins, Surgeon's Office, USARAL, Fort Richardson, Alaska, secretary to the Alaska V. M. A.

ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. John D. Clark, 518 West Oak St., Scottsdale, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. Gwyn Chapin, 2215 E. Calle Vista, Tucson, Ariz., secretary.

ARKANSAS—Pulaski County Veterinary Medical Society, the second Tuesday of each month. Harvie R. Ellis, 54 Belmont Drive, Little Rock, Ark., secretary-treasurer.

CALIFORNIA—Alameda-Contra Costa Veterinary Medical Association, the fourth Wednesday of every month. L. M. Proctor, 24 Meadow Lane, Concord, Calif., secretary.

Bay Counties Veterinary Medical Association, the second Tuesday of February, April, July, September, and December. Herb Warren, 3004 16th St., San Francisco, Calif., executive secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Paul S. Chaffee, 2333 McKinley Ave., Fresno, Calif., secretary.

Humboldt-Del Norte Counties Veterinary Medical Association, the second Tuesday of January, May, September, and November. Dr. M. Lunstra, P. O. Box 734, Eureka, Calif., secretary-treasurer.

Kern County Veterinary Medical Association, the first Thursday evening of the month. Francis Dawson, 2007 Nile St., Bakersfield, Calif., secretary-treasurer.

Mid-Coast Veterinary Medical Association, the first Thursday of each month. William P. Matulich, P. O. Box 121, San Luis Obispo, Calif., secretary-treasurer.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. V. Todorovic, 47 Mann Ave., Watsonville, Calif., secretary.

Northern California Association of Veterinarians, the second Tuesday of the month. George Crenshaw, 1137 8th St., Orland, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Covell in Modesto, Calif. Kenneth E. Erwin, Box 841, Manteca, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. K. R. Wilcox, P.O. Box 98, Upland, California, secretary-treasurer.

Orange County Veterinary Medical Association, the third Thursday of each month. H. M. Stanton, 1122, S.E. U.S. Highway 101, Tustin, Calif., secretary.

Peninsula Veterinary Medical Association, the third Tuesday of the month, Arthur L. Gilger, 2905 South El Camino Real, San Mateo, Calif., secretary-treasurer.

Redwood Empire Veterinary Medical Association, the third Thursday of the month. R. R. Rediske, 833 Vallejo Ave., Novato, Calif., secretary-treasurer.

Sacramento Valley Veterinary Medical Association, the second Thursday of each month with the location specified monthly. Eugene C. Story, 4819 "V" St., Sacramento 17, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of the month. Robert F. Burns, 7572 North Ave., Lemon Grove, Calif., secretary-treasurer.



San Fernando Valley Chapter SCVMA, the second Tuesday of each month at 7:30 p.m., Hody's Restaurant, North Hollywood, Calif. Barbara G. Shirley, Canoga Park, Calif., secretary-treasurer.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, Calif., secretary.

San Francisco Veterinarians, every other month—meetings decided at previous sessions. J. Wachs, 317D Sacramento St., San Francisco, Calif., secretary-treasurer.

Santa Barbara-Ventura Counties Veterinary Medical Association, every three months, no set date. Gerald M. Clark, 5415 8th St., Carpinteria, Calif., secretary-treasurer.

*(continued on adv. p. 46)*

# Public Relations

BRIAN M. FORSTER,
DIRECTOR OF PUBLIC INFORMATION

## OHIO AND FLORIDA EXHIBIT AT HEALTH FAIRS

The Cleveland Health Museum recently completed an interprofessional display on pets, pests and medical research. As the theme suggests, veterinarians played a large part in the exhibit and the Cuyahoga County (Ohio) Veterinary Medical Association helped by providing time and materials.

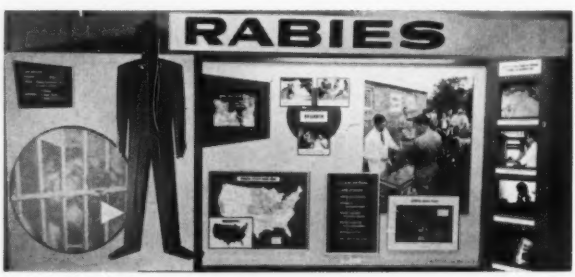
Local veterinarians also borrowed an exhibit on rabies from the U.S. Public Health Service's Communicable Disease Center in Atlanta, Ga.

Many individuals, institutions and companies contributed toward making the exhibit a success. Veterinarians, veterinary institutions and veterinary suppliers contributing included Drs. Franklin A. Coy, Robert H. Fitts, and James S. Sasala of the Cuyahoga County VMA; Chagrin Falls Veterinary Hospital and Coy Small Animal Hospital; Abbott Laboratories; General Biological Supply House, Inc.; Ohio Chemical and Surgical Co.; and Pitman-Moore Co.

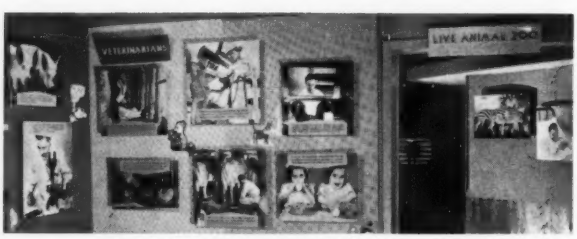
The Equitable Life Assurance Society also provided some of their booklets, "Pets, for Assurance of a Fuller Life."

In Florida, the Florida Veterinary Medical Association participated in a Palm Beach County Health Fair with an exhibit prepared by Dr. Dwight Lichty. His display was 30 feet long and covered many facets of the veterinary profession concisely and well.

Both displays were significant contributions to interprofessional public relations and public understanding of the veterinary profession.




**Here are three of the displays on pets, pests and medical research recently presented at the Cleveland Health Museum in Ohio.**



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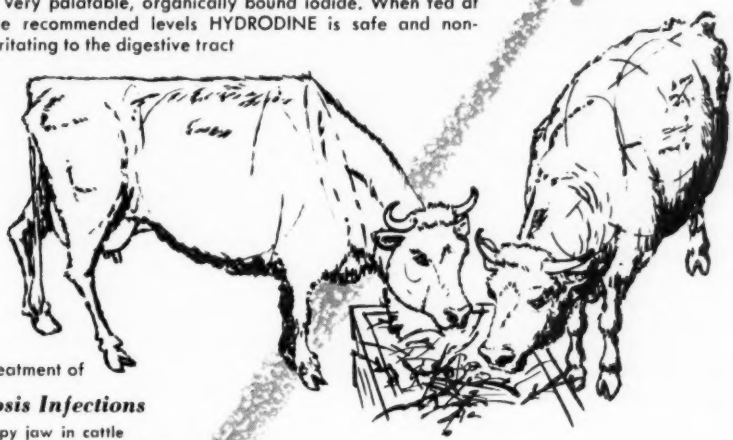

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  (Foot Rot)
- ***Thyroid dysfunction***
- ***Chronic coughing***

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## History of the AVMA

**1883**

The meetings for 1883 were again held in Boston and at the American Veterinary College. Among the 21 new members admitted was W. Horace Hoskins, later secretary, then president, and a long-time stalwart of the Association.

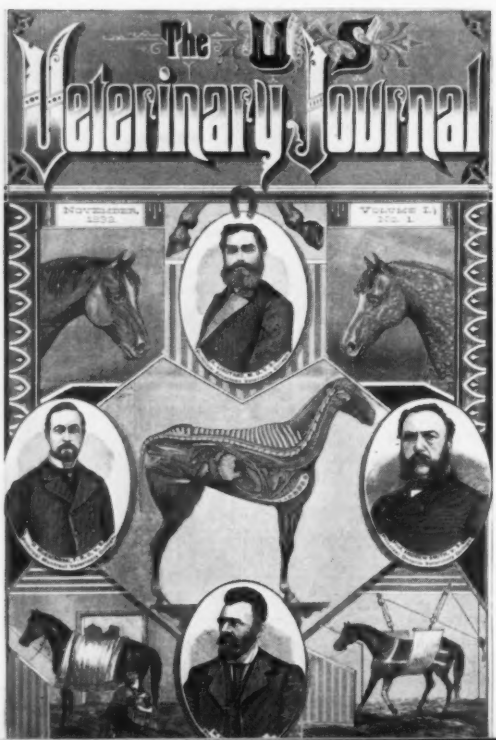
Elected officers were: president, W.B.E. Miller, of New Jersey; vice president, W. J. Coates; secretary, C. B. Michener; and treasurer, Charles Burden. The election of Dr. Miller was the first major break in the monopoly exercised by a coalition of Massachusetts and New York members, regarding the major offices of the Association. Prior to this date, 13 of 14 presidents, 7 of 8 secretaries, and all 5 treasurers had been from New York or Massachusetts. During the second 25 years, only 6 of the 34 major officers were from these two states.

In an editorial in the *Review* for July, 1883, Liautard mentions that a number of "Western" states, Illinois, Wisconsin, Iowa, Michigan and Ohio, were in the process of calling state veterinary conventions: "to organize and discuss . . . the advance of veterinary science. The Eastern States . . . . ought to form their State Associations; and when once each State in the Union has her State Veterinary Medical Association, how easy it will be for all to unite under a grand body, the *American Veterinary Association*."

While Liautard probably was aware of more than he alludes to, his suggestion concerning an "American Veterinary Association" is puzzling. He knew that the USVMA did not in fact represent the veterinary profession of the entire country and that "Western" veterinarians were dissatisfied with the situation. That he may have suggested this second association as a threat to jar the USVMA into action is intimated by his later statement, "Already a large nucleus for such an organization exists. . . . It will be to the United States Veterinary Medical Association that these State societies will naturally attach themselves."

In November, 1882, the *United States Veterinary Journal* appeared, presumably edited by A. H. Baker, co-founder of the Chicago Veterinary College. The real promoter, however, was T. E. Daniels, a printer, who evidently had conceived the idea of organizing the American veterinary profession and publishing its official organ as a profitable enterprise. He was successful in getting state associations organized in Illinois, Indiana, Michigan, Ohio, New York (in competition with the existing state society), and Missouri, for which associations his Journal did serve as the official organ until its demise in November, 1884.

A more insidious part of his scheme was that this new national group was to be named the United States Veterinary Medical Association. One of the arguments used by those who had urged incorporation of the USVMA soon after its founding was that any group could incorporate under this name and deprive the *de facto* USVMA of its right to the name. But even with this as a real, rather than merely a potential threat, the Association was not incorporated until 1916. Daniels' plan did have one strong point—his national association was to be governed by delegates chosen by the state associations, the same plan adopted by the AVMA 50 years later.




First issue of the U. S. Veterinary Journal. Dr. Liautard strongly objected to the unauthorized use of his picture because he felt it implied his endorsement of the rival journal.

*(REGULARLY SCHEDULED MEETINGS—continued from adv. p. 41)*

Santa Clara Valley Veterinary Medical Association, the last Tuesday of the month. Robert L. King, 1269 Grant St., Santa Clara, Calif., secretary-treasurer.

Southern California Veterinary Medical Association, the third Wednesday of the month. Mr. Don Mahan, 1919 Wilshire Blvd., Los Angeles 57, Calif., executive secretary.

Tulare County Veterinary Medical Association, the second Thursday of each month at the Tagus Ranch, Tulare. Larry A. Jackson, 12191 Lacey Blvd., Hanford, Calif., secretary-treasurer.

COLORADO—Denver Area Veterinary Medical Society, the fourth Tuesday of every month. Charles H. Garvin, 12024 E. 14th Ave., Aurora 8, Colo., secretary-treasurer.



Northern Colorado Veterinary Medical Society, the first Wednesday of each month, in Fort Collins. E. J. Carroll, Dept. of Clinics and Surgery, Colorado State University, Fort Collins, Colo., secretary.

DELAWARE—New Castle County Veterinary Medical Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. A. P. Mayer, Jr., R.F.D. 2, Newark, Del., secretary-treasurer.

DISTRICT OF COLUMBIA—District of Columbia Veterinary Medical Association, the second Tuesday evenings of January, March, May, and October. R. B. Gochenour, 10109 Ashwood Dr., Kensington, Md., secretary-treasurer.

FLORIDA—Big Bend Veterinary Medical Association, meets the first Sunday of each month at 5:00 p.m. at the Tallahassee Dining Room, Tallahassee. Mrs. Robert E. Lee, P.O. Box 3236, Tallahassee, Fla., acting secretary.

Central Florida Veterinary Medical Association, the first Friday of each month at 8:00 p.m.; place specified monthly. William L. Sippel, P.O. Box 847, Kissimmee, Fla., secretary.

Florida West Coast Veterinary Medical Association, the second Wednesday of each month at the Lighthouse Inn, St. Petersburg. S. H. Carr, P.O. Box 1206, Dunedin, Fla., secretary.

Hillsborough Veterinary Medical Society, the second Monday of every month; time and place are specified monthly. J. H. Rogers, 311 N. Ben Avon Dr., Tampa, Fla., secretary-treasurer.

Jacksonville Veterinary Medical Association, the first Thursday of every month at the Green Turtle Restaurant, at 8:00 p. m. Edwin G. Clampett, 5150 Love Grove Rd., Jacksonville 7, Fla., secretary.

Northwest Florida Veterinary Medical Society, third Wednesday of each month; time and place specified monthly; David B. Aronson, 923 Belair Road, Pensacola, Fla., secretary.

Palm Beach Veterinary Society, the last Thursday evening of each month. McArthur Dairy Building, Four Points, W. Palm Beach. D. L. Lichty, 700 Hollywood Place, West Palm Beach, Fla., secretary.

Pinellas County Veterinary Society, the first Monday of January, February, April, May, July, August, October, and November at the Fort Harrison Hotel, Clearwater, Fla., at 7:30 p.m. L. H. Sellers, Jr., 3813 Tyrone Blvd., St. Petersburg, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. John S. Haromy, Route 1, Box 107-A, Lake Wales, Fla., secretary.

South Florida Veterinary Society, the third Wednesday of each month; time and place specified monthly. E. J. Gissendanner, 1665 N.E. 123rd St., North Miami, Fla., secretary.

Suwannee Valley Veterinary Medical Association, meets each fourth month; time and place specified quarterly. G. L. Burch, P.O. Box 405, Ocala, Fla., secretary.

Volusia County Veterinary Medical Association, the fourth Thursday of each month. Robert E. Cope, 127 E. Mason, Daytona Beach, Fla., secretary.

GEORGIA—Atlanta Veterinary Medical Society, the third Thursday of each month at the Elk's Home, 726 Peachtree St., Atlanta. Richard Montgomery, P.O. Box 222, Morrow, Ga., secretary-treasurer.

East Georgia Veterinary Medical Association, quarterly, date and meeting place varies. Hugh F. Arundel, P.O. Box 153, Statesboro, Ga., secretary.

Georgia-Carolina Veterinary Medical Association, the second Monday of each month at 8:00 p.m., at the

Town Tavern, Augusta, Ga. James M. Hawk, 700 E. Buena Vista Ave., North Augusta, S. C., secretary.

North Georgia Veterinary Medical Association, quarterly, no set date, the spring meeting at the Veterinary School, Athens, Ga. S. J. Shirley, Commerce, Ga., secretary.

South Georgia Veterinary Medical Association, the second Sunday of each quarter at 3:30 p.m., at the Radium Springs Hotel, Albany, Ga. M. W. Hale, Route 2, Tifton, Ga., secretary.

HAWAII—Honolulu Veterinary Society, the third Tuesday evening of January, March, May, July, September, and November. Howard H. Furomoto, 1135 Kapahulu Ave., Honolulu, Hawaii, secretary-treasurer.

ILLINOIS—Central Illinois Veterinary Medical Association, June 9, Sept. 9, and Dec. 10, 1959. Howard Bennett, 120 W. Jefferson St., Petersburg, Ill., secretary-treasurer.

Chicago Veterinary Medical Association, the second Tuesday of each month, Charles H. Armstrong, 1021 Davis St., Evanston, secretary.

INDIANA—Calumet Area Veterinary Medical Association, the first Thursday of each month. Bruce Sharp, Box 166, Hobart, Ind., secretary-treasurer.

Central Indiana Veterinary Medical Association, the second Wednesday of each month. P. T. Parker, 224 N. Mill St., Plainfield, Ind., secretary-treasurer.

Michiana Veterinary Medical Association, the second Thursday of every month except July and December, at the Hotel LaSalle, South Bend, Ind. Stanton Williamson, 217 W. Chippewa St., South Bend, Ind., secretary.

Northwestern Indiana Veterinary Medical Association, the fourth Thursday of each month, except August, January, and February. Harvey R. Smith, R.R. 2, Box 30, Lowell, Ind., secretary-treasurer.

Tenth District Veterinary Medical Association, the third Thursday of each month. J. S. Baker, P.O. Box 52, Pendleton, Ind., secretary.

IOWA—Cedar Valley Veterinary Medical Association, the second Monday of each month, except January, July, August, and October in Black's Tea Room, Waterloo, Iowa. E. L. Koch, Plainfield, Iowa, secretary.

Central Iowa Veterinary Medical Association, the third Monday of each month, except June, July, and August at 6:30 p.m., Breeze House, Ankeny, Iowa. S. L. Hendricks, secretary-treasurer.

Coon Valley Veterinary Medical Association, the second Wednesday of each month, September through May, at Bradford Hotel, Storm Lake, at 7:30 p.m. V. R. Howie, Manson, Iowa, secretary.

East Central Iowa Veterinary Medical Association, the third Thursday of each month at 6:30 p.m., usually at the Hotel Roosevelt in Cedar Rapids, Iowa. T. F. Bartley, P.O. Box 454, Cedar Rapids, secretary.

Fayette County Veterinary Medical Association, the third Thursday of each month at 6:30 p.m. in West Union, Iowa. M. F. Frevert, West Union, secretary.

North Central Iowa Veterinary Medical Association, the third Thursday of April, at the Warden Hotel, Fort Dodge, Iowa. H. Engelbrecht, P. O. Box 797, Fort Dodge, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Wisneslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northwest Iowa Veterinary Medical Association, the second Tuesday of February, May, September, and December, at the Community Building, Sheldon. Warren Verploeg, Paulina, Iowa, secretary.

Southeastern Iowa Veterinary Association, the first Tuesday of each month at Mt. Pleasant. H. D. McCreedy, Ottumwa, Iowa, secretary.

Southwestern Iowa Veterinary Medical Association, the first Tuesday of April and October, Hotel Chieftain, Council Bluffs. F. S. Sharp, Red Oak, Iowa, secretary.

Upper Iowa Veterinary Medical Association, the third Tuesday of each month at All Vets Center, Clear Lake, at 7:00 p.m. Delmar Diercks, Rockwell, secretary.

KENTUCKY—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. R. H. Folsom, P.O. Box 323, Danville, Ky., secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday of each month in Louisville or within a radius of 50 miles, except January, May, and July. G. R. Comfort, 2102 Reynolds Lane, Louisville, Ky., secretary-treasurer.

LOUISIANA—New Orleans Veterinary Medical Association, the third Thursday of every month at the Monteleon Hotel, New Orleans, at 8:30 p.m. Ronald C. Francis, 6421 Chef Menteur Highway, New Orleans, La., secretary-treasurer.



MARYLAND—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m., at the Park Plaza Hotel, Charles and Madison St., Baltimore Md. Leonard D. Krinsky, 6111 Hartford Rd., Baltimore, Md., secretary.

MICHIGAN—Central Michigan Veterinary Medical Association, the first Wednesday of every month at 7 p.m. Jerry Fries, 2070 E. Main St., Owosso, Mich., secretary.

Mid-State Veterinary Medical Association, the fourth Thursday of each month with the exception of November and December. Robert W. Acton, 4110 Spring Rd., Jackson, Mich.

Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. Alvin R. Conquest, P.O. Box 514, Grand Blanc, Mich., secretary.

Southeastern Michigan Veterinary Medical Association, the fourth Wednesday of every month, September through May. Louis J. Rossoni, 24531 Princeton Ave., Dearborn 8, Mich., secretary.

MINNESOTA—Lake Region Veterinary Medical Association, quarterly meetings, with time and place specified prior to each meeting. J. A. Strache, Battle Lake, Minn., secretary-treasurer.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of each month (except July and August), at the Coronado Hotel, Lindell Blvd. and Spring Ave., St. Louis Mo., at 8 p.m. Edwin E. Epstein, 4877 Natural Bridge Ave., St. Louis 15, Mo., secretary.

Kansas City Veterinary Medical Association and Kansas City Small Animal Hospital Association, the third Thursday of each month at the Hotel President, Kansas City, Mo. Iain M. Paton, 12203 W. 70th Ter., Kansas City, Mo., secretary.

NEVADA—Western Nevada Veterinary Society, the first Tuesday of each month. Paul S. Silva, 1170 Airport Road, Reno, Nev., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, R.D. 1, Box 284A, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April, except December, at the Irvington House, 925 Springfield Ave., Irvington, N.J. Bernard M. Weiner, 787 Clinton Ave., Newark, N.J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Elks Club, Hackensack. James R. Tanzola, Upper Saddle River, N.J., secretary.

Northwest Jersey Veterinary Society, the third Wednesday of every odd month. L. S. Nilsson, Jr., 224 Hardwick St., Belvidere, N. J., secretary-treasurer.

Southern New Jersey Veterinary Medical Association, the fourth Tuesday of each month at the Collmont Diner, Collingswood, N.J. Jay Simmons, 247 South White Horse Pike, Audubon, N. J., secretary.

NEW MEXICO—Bernalillo County Veterinary Practitioners Association, the third Wednesday of each month, Fez Club Albuquerque. Donald W. Fitzgerald, 1825 Lomas Blvd., N.E., Albuquerque, N.M., secretary-treasurer.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 24 Warwick Ave., Scarsdale, N.Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 40 Meredith St., Rochester 9, N. Y., secretary-treasurer.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel, Greensboro. W. A. Sumner, 3741 High Point Rd., Greensboro, N.C. secretary.

Eastern North Carolina Veterinary Medical Association, the last Tuesday evening of each month, time and place specified monthly. Byron H. Brow, Box 453, Goldsboro, N. Car., secretary-treasurer.

Piedmont Veterinary Medical Association, the last Friday of each month. J. G. Martin, Boone, N. Car., secretary.

Twin Carolinas Veterinary Medical Association, the third Friday of each month at Orange Bowl Restaurant, Rockingham, N. Car., at 7:30 p.m. J. E. Currie, 690 N. Leak St., Southern Pines, N. Car., secretary.

Western North Carolina Veterinary Medical Association, the third Thursday of every month at 7:00 p.m. in the George Vanderbilt Hotel, Asheville, N. Car. H. A. Justus, 924 Lakeside Dr., Hendersonville, N. Car., secretary.

OHIO—Cincinnati Veterinary Medical Association, the third Tuesday of every month at Shuller's Wigwam, 6210 Hamilton Ave., at North Bend Rd., Ronald A. Meeks, 11081 Springfield Pike, Cincinnati 15, Ohio, secretary.

Clark County Veterinary Medical Association, meetings held quarterly; time and place irregular. R. Edmondson, South Charleston, Ohio, secretary-treasurer.

Columbus Academy of Veterinary Medicine, the third Thursday of every month, September through May; place irregular. Earl Simondson, 3120 Valley View, Columbus, Ohio, secretary.

Cuyahoga County Veterinary Medical Association, the first Wednesday in September, October, December, February, March, April, and May, at 9:00 p.m., at the Carter Hotel, Cleveland, Ohio. R. W. Stockstill, 6545 Mayfield Rd., Cleveland, Ohio, secretary.

Dayton Veterinary Medical Association, the first Tuesday of every month, Pappy's Kitchen Klub, 5102 W. Main St. Dr. William Pumpelly, 6801 Airway Rd., Dayton, Ohio, secretary-treasurer.

Fifth District Veterinary Medical Association, meetings held quarterly; time and place irregular. E. J. Kersting, 115 Sheffield Rd., Columbus, Ohio, secretary.

Geauga County Veterinary Medical Society, the third Wednesday of each month, at the Manor House, Newberry, Ohio, at 1:00 p.m. Peter J. Clemens, Jr., R. D. 2, Chagrin Falls, Ohio, secretary.

Kilbuck Valley Veterinary Medical Association, the first Wednesday of alternate months beginning with February; place irregular. Charles Gale, Ohio Agricultural Experiment Station, Wooster, Ohio, secretary-treasurer.

Knox County Veterinary Medical Association, meetings irregular. F. O. Haberman, Centerburg, Ohio, president.

Lorain County Veterinary Medical Association, the second Wednesday of April, June, October, December, and February; place irregular. G. W. Bunyan, 37200 Detroit Rd., Avon, Ohio, secretary-treasurer.

Madison County Veterinary Medical Association, quarterly; date and place irregular. James Herman, Mechanicsburg, Ohio, secretary-treasurer.

Mahoning County Veterinary Medical Association, the fourth Tuesday of each month at 9:00 p.m., at the Maen-

nerchor Club, Youngstown. Sam Segall, 2935 Glenwood Ave., Youngstown, Ohio, secretary-treasurer.

Miami Valley Veterinary Medical Association, the first Wednesday of December, March, June, and September; place irregular. L. J. Grilliot, Route 1, Troy, Ohio, secretary-treasurer.

North Central Ohio Veterinary Medical Association, the last Wednesday of each month, except during the summer months; place irregular. Ben Henson, 268 S. Main St., Mansfield, Ohio, secretary-treasurer.

Northeastern Ohio Veterinary Medical Association, meetings and place irregular. James Bridenstine, East Orwell, Ohio, secretary.

Northwestern Ohio Veterinary Medical Association, the last Wednesday of March and July; place irregular. F. C. Hartman, 3904 Rushland Ave., Toledo, Ohio, secretary-treasurer.

Ross County Veterinary Medical Association, meetings and place irregular. W. A. Hirsch, Chillicothe, secretary-treasurer.

South Central Ohio Veterinary Medical Association, the third Thursday of each month at the Jo-Kar Restaurant, Lancaster. James Hagely, Lancaster, Ohio, secretary.



Southeastern Ohio Academy of Veterinary Medicine, every other month; time and place irregular. M. S. Phillips, Athens, Ohio, secretary.

Southern Ohio Veterinary Medical Association, meetings held quarterly at Wilmington; time irregular, S. E. Peterson, 1093 Rombach Ave., Wilmington, Ohio, secretary-treasurer.

Stark County Veterinary Medical Association, the second Tuesday of every month, at Holiday Inn, W. Tuscarawas St., Canton, Robert Leed, 5500 Cleveland Ave., N.W., North Canton, Ohio, secretary-treasurer.

Summit County Veterinary Medical Association, the last Tuesday of every month (except June, July, and August), at the Mayflower Hotel, Akron, Ohio. M. L. Scott, 42 W. Market St., Akron, Ohio, secretary-treasurer.

Toledo Veterinary Medical Association, every other month; date and place irregular. F. C. Hartman, 3904 Rushland Ave., Toledo, Ohio, corresponding secretary.

Tri-County Veterinary Medical Association, the fourth Wednesday of January, May, and September; place irregular. Mrs. Fred Guenther, Springboro, Ohio, secretary-treasurer.

Trumbull County Veterinary Medical Association, meet three or four times a year; time and place irregular. R. A. Hanawalt, P.O. Box 117, Kinsman, Ohio, secretary-treasurer.

West Central Veterinary Medical Association, third Thursday of February, June, September, and November, at the Lima Club, Lima. K. R. Heidt, 1055 Spencerville Rd., Lima, Ohio, secretary-treasurer.

Wheeling Valley Veterinary Medical Association, meetings held quarterly; time and place irregular. Earl Weaver, 1406 S. Zane Rd., Martins Ferry, Ohio, vice-president.

OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month, 7:30 p.m., Patrick's Foods Cafe, 1016 N.W. 23rd St., Oklahoma City. Claude A. Tigert, 3032 N.W. 68th St., Oklahoma City, Okla., secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month at the City-County Health Building, 4616 E. 15th St., Tulsa, Okla. Arlen D. Hill, 5302 E. 11th St., Tulsa, Okla., secretary.

Tulsa Association of Small Animal Veterinarians, first and third Mondays. City-County Health Dept. R. H. Featherston, 3129 S. Winston, Tulsa 5, Okla., secretary.

OREGON—Portland Veterinary Medical Association, the second Tuesday of each month, at 7:30 p.m. Ireland's Restaurant, Lloyds, 718 N.E. 12th Ave., Portland. Donald L. Moyer, 8415 S.E. McLoughlin Blvd., Portland 2, Ore., secretary.

Willamette Veterinary Medical Association, the third Tuesday of each month, except July and August, at the Marion Hotel, Salem. Robert J. Mallorie, P.O. Box 155, Silverton, Ore., secretary.

PENNSYLVANIA—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine. Raymond C. Snyder, N.E. Corner 47th St. and Hazel Ave., Philadelphia 43, Pa., secretary.

Lehigh Valley Veterinary Medical Association, the first Thursday of each month. Stewart Rockwell, 10th and Chestnut Sts., Emmaus, Pa., secretary.

Pennsylvania Northern Tier Veterinary Medical Association, the third Wednesday of each odd numbered month. R. L. Michel, Troy, Pa., secretary.

SOUTH CAROLINA—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fairforest Hotel, Union, S. Car. John W. Dantzler, 272 Wiles St., Orangeburg, S. C., secretary.

TEXAS—Coastal Bend Veterinary Medical Association, the third Wednesday of each month, at 8:00 p.m.; place varies. Carl A. Keller, 6103 Highway 9, Corpus Christi, Texas, secretary-treasurer.

Dallas County Veterinary Medical Association, the first Tuesday of each month at 7:30 p.m., at a place to be specified. Frank N. Black, 12830 Preston Rd., Dallas, Texas, corresponding secretary.

UTAH—Salt Lake Small Animal Hospital Association, the first Monday of every month, at the Holiday Inn, 3040 South State St., Salt Lake City, at 12:15 p.m. Douglas H. McKelvie, 1220 S. State St., Salt Lake City, Utah, secretary-treasurer.

VIRGINIA—Central Virginia Veterinary Association, the second Thursday of each month at 8:00 p.m., except July and August, at a place in Richmond to be announced monthly. Edwin M. Crawford, secretary-treasurer.

Northern Virginia Veterinary Conference Association, the second Tuesday of each month. T. P. Koudelka, P.O. Box 694, Harrisonburg, Va., secretary.

Northern Virginia Veterinary Society, the second Wednesday of every third month. Meeting place announced by letter. H. C. Newman. Box 145, Merrifield, secretary.

Southwest Virginia Veterinary Medical Association, the first Thursday of each month. D. F. Watson, Blacksburg, secretary.

WASHINGTON—Seattle Veterinary Medical Association, the third Monday of each month, Magnolia American Legion Hall, 2870 32nd W., Seattle. Roy C. Toole, 10415 Main St., Bellevue, secretary.

South Puget Sound Veterinary Association, the second Thursday of each month except July and August. B. D. Benedictson, 3712 Plummer St., Olympia, Wash., secretary.

WEST VIRGINIA—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the third Thursday of each month in the Hotel Pritchard, Huntington, W. Va., at 8:30 p.m., Harry J. Fallon, 200 5th St., W. Huntington, W. Va., secretary.

WISCONSIN—Central Wisconsin Veterinary Medical Association, the second Wednesday of each quarter (March, June, September, and December). E. D. Baker, 1418 LaSalle Ave., Barron, Wis., secretary.

Coulee Region Veterinary Medical Association, the third Wednesday of every other month. F. N. Petersen, Box 127, Cashton, Wis., secretary.

Dane County Veterinary Medical Association, the second Thursday of each month. All but the special meetings will be held at the Top Hat Restaurant, Middleton. Robert E. Hall, 5718 Dogwood Place, Madison 5, Wis., secretary-treasurer.

Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd. Dr. Raymond Pahle, 10827 W. Oklahoma Ave., Milwaukee, Wis.

Northeastern Wisconsin Veterinary Medical Association, the third Wednesday in April. William Madson, 218 E. Washington St., Appleton, Wis., secretary.

Rock Valley Veterinary Medical Association, the first Wednesday of each month. L. C. Allenstein, 209 S. Taft St., Whitewater, Wis., secretary.

Southeastern Veterinary Medical Association, the third Thursday of each month. John R. Curtis, 419 Cook St., Portage, Wis., secretary.

Wisconsin Valley Veterinary Medical Association, the second Tuesday of every other month. John B. Fleming, 209 E. 4th St., Marshfield, Wis., secretary.

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1960 graduate with experience in radiology desires position in small animal clinic where radiology experience can be utilized. Address Box D 17, JOURNAL of the AVMA.

June graduate desires equine position. Mixed practice experience. Resume upon request. Age 28, married, military obligation completed. Address Box D 13, JOURNAL of the AVMA.

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Wanted to purchase or lease—small animal practice in Georgia or Illinois. Address Box D 18, JOURNAL of the AVMA.

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For sale to experienced veterinarian—two-man mixed practice, modern animal hospital, 30 cages. 25 per cent down payment. Bluegrass area. Address Box 323, Danville, Kentucky. Phone 478.

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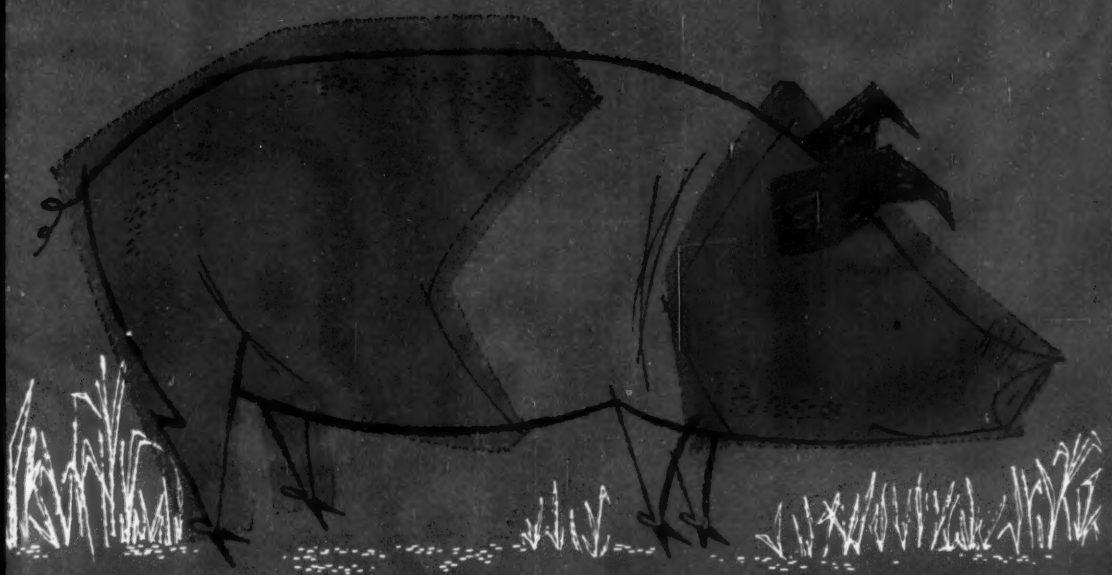

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**DECTON controls most cases of early pinkeye with one treatment!**

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**DECTON'S proteolytic activity aids in the removal of encrustations and promotes healing.**

**DECTON'S unique, localized action does not prejudice systemic antibiotic therapy!**

**DECTON reduces photophobia by screening out harmful sunlight!**

**DECTON is safe, with improved non-caking properties!**

**DECTON is packaged in convenient 1¼ oz. plastic puffer bottles in attractive display carton of 12!**

*Write for case reports . . .*

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